Vol. 105 No. 2631 THURSDAY OCT 25 1951 9d.

THE MODEL ENGINEER

The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST.. LONDON, W.C.2

25TH OCTOBER 1951 VOL. 105 NO. 2631

SMOKE RINGS

Our Cover Picture

● THIS WEEK'S photograph shows a model yacht with a difference. Instead of being merely a racing machine, it is actually a replica of a full-sized ocean-going racing yacht, complete with dinghy, enclosed cabin accommodation and open cockpit. Building such a model is considerably more interesting than building what is merely a decked hull with the irreducible minimum of gear, whose functions is to attain high speeds. Admittedly, the winning of races is of absorbing interest to the average model yachtsman, but a yacht such as is shown in our picture need be scarcely any slower than its racing counterpart, and at the same time the hull is an interesting piece of modelling and one which would grace any sideboard at such times as it is not sailing. Most models spend only a small proportion of their time in sailing, their time being spent in the club house under lock and key and hidden from admiring eyes. Of course, the question of size comes into it, even a Marblehead would be too big to be displayed in most ordinary rooms, but a 36 in. class model hull is not unreasonably large. The model in the illustration is of this size and is an excellent example of its class. She was designed and built by Captain S. T. Grant, of Bournemouth, and the photograph was taken by Mr. C. B. Maycock, of Barnet.

The Old-timers

● THE RECENT series of articles entitled " That Wonderful Year . . . " by " The Dominie," have brought us many letters of appreciation from delighted readers, and showing clearly that the fascination of the early years of engineering, with their many problems, still appeals to a very large section of the community. On the other hand, we have received a few letters roundly condemning us for, as one reader puts it, " wasting space on so much digging up of the past that can achieve nothing and lead us nowhere." These opposite lines of thought were, we knew, almost bound to reveal themselves as a result of the articles mentioned ; so perhaps we may be permitted to offer some explanation as to why *we* decided to publish the series.

The history of engineering from the time of the pioneers up to the present day, is one long record of continuous advance, and this is the principal reason why it is so fascinating. To most thinking people, it arouses pride and admiration of past achievements which have had a profound effect upon our mode of life ; at the same time, it is an inspiration to the modern generation of engineers, in all branches of the industry, urging them on to further and, perhaps, even greater triumphs. So, far from " living in the past," historians who are continually setting down the

records of past achievements, and the publishers who make those records available, are performing a service to the community at large.

But the model engineer has his own point of view which must also be considered ; to him, the reproduction of the important and mighty creations of an earlier age, provides him with a potent means of exercising his own creative skill. Give him the idea and he will, according to the means he has available, translate it into a tangible form, for the mere love of creating something. This is the essence of our hobby, which is independent of time or period ; the true model engineer is not primarily concerned with the era in which the prototype he is reproducing was itself created ; he chooses his prototype according to its appeal to his tastes, and, obviously, the past provides him with the greatest number from which to choose. That is a natural order of things, and there is nothing that any living soul can do about it ; to applaud it or to condemn it is really futile, but to see it and appreciate it as it is, is quite another matter. This, and much more besides, was in our mind when we accepted " The Dominie's " articles, and we published them knowing full well that only a minute percentage of the large number of our readers can, within a few minutes and in any other way, lay their hands upon such a treasury of ideas.

Can Anyone Help ?

● WE ARE urgently needing to borrow the following *complete* issues of THE MODEL ENGINEER, for our advertising records : Volumes 78, 79, 80, 82, 84, 85, 87, 88, 89, 91, 94, 102 and 103. Each one must contain all the advertisement pages. If any readers are willing to lend us their copies for a brief period, we would be most grateful. Needless to say, we would pay the carriage both ways. Anyone who can help us is requested to get into touch with the Advertisement Manager at the " M.E." offices.

The Staines Exhibition

● THE 1951 exhibition organised by the Staines and District Society of Model Engineers and Craftsmen, and held at the Staines Primary School on September 29th, was a very attractive show. The number and variety of the exhibits were very satisfactory and the general quality was excellent. Out in the school playground, a long length of multi-gauge portable track provided means for running some steam locomotives throughout the day.

Incidentally, among the exhibits in the competition section, there was a remarkable example of that kind of miniature steam locomotive which appeals so strongly to us ; that is, it was an *exact* copy of its prototype, externally. We had to study it a long time before we noticed anything that could be said to be wrong.

This particular example was a G.W.R. " Saint " class two-cylinder 4-6-0 express passenger engine for 3½-in. gauge, built by Mr. Arnold, of Slough, and we have already ear-marked it as an exhibit at the 1952 " M.E." Exhibition ! This fine engine is not yet painted, but we have seen it working, and we can vouch for the fact that it is a splendid performer in spite of the true-to-scale construction. The Staines society was fortunate in being among the first to exhibit this outstanding example of miniature locomotive building.

Boats, cars, aircraft, various pieces of workshop equipment, old-time horse-drawn road vehicles, traction engines and some ornamental electric light fittings all helped to ensure that visitors' interest never flagged.

The Medway Show

● WE RECENTLY paid a visit to Chatham to view the exhibits at the Medway Model and Experimental Engineering Society's annual show.

Founded as recently as 1945, this society is making great strides in a wide field of interest, which includes photography, art and general handicrafts, and the high quality of its work was characterised by a most interesting display in all categories.

Among the major attractions were a miniature Grand Prix circuit (three rails) on which daily demonstrations were given, a first-class cinema, complete with effects, organ and films made by members of the society, and demonstrations of water-colour paintings by an artist whose delightful ten-minute paintings of scenes from Devon and Cornwall, all from memory, were, to say the least, uncanny ! There were also demonstrations of hand-loom weaving, a hobby which is becoming increasingly popular.

In the competition section the quality of workmanship was high, the models bearing the unmistakable stamp of good, enthusiastic craftsmanship.

Congratulations, Medway ; we shall look forward to hearing a lot more about your activities.

Progress at Winchester

● WE ARE glad to learn from Mr. C. H. Bushby, hon. secretary of the Winchester and District Society of Model and Experimental Engineers, that the first " Open Night " was held on September 26th at the society's new workshop and meeting-room, The Hut, Stanmore Recreation Ground, Winchester. Quite a large number of members and friends attended, several bringing along models and other exhibits to display.

Mr. Allen showed his 3½-in. gauge live steam locomotive *Jasper*, while Mr. Bond demonstrated the capabilities of his 1-in. scale showman's engine working on compressed air supplied by a bicycle pump.

Mr. C. R. Jones had on view his Hipp pendulum movement for a new electric impulse clock he is making. Other items to be seen included a showman's trailer complete with swing-boats, attachments for lathes, etc.

The society has installed electric lighting in its new quarters, and this enabled the principal item on the programme to be given. This was the Petroleum Films Bureau's sound film " The Cornish Engine," which was much enjoyed by all present.

More mechanical equipment and furniture is needed, and if anybody in the Winchester area has anything of this nature to dispose of, the society would be pleased to make nominal offers for it and arrange collection. Mr. Bushby's address is : 7, Fox Lane, Stanmore, Winchester.

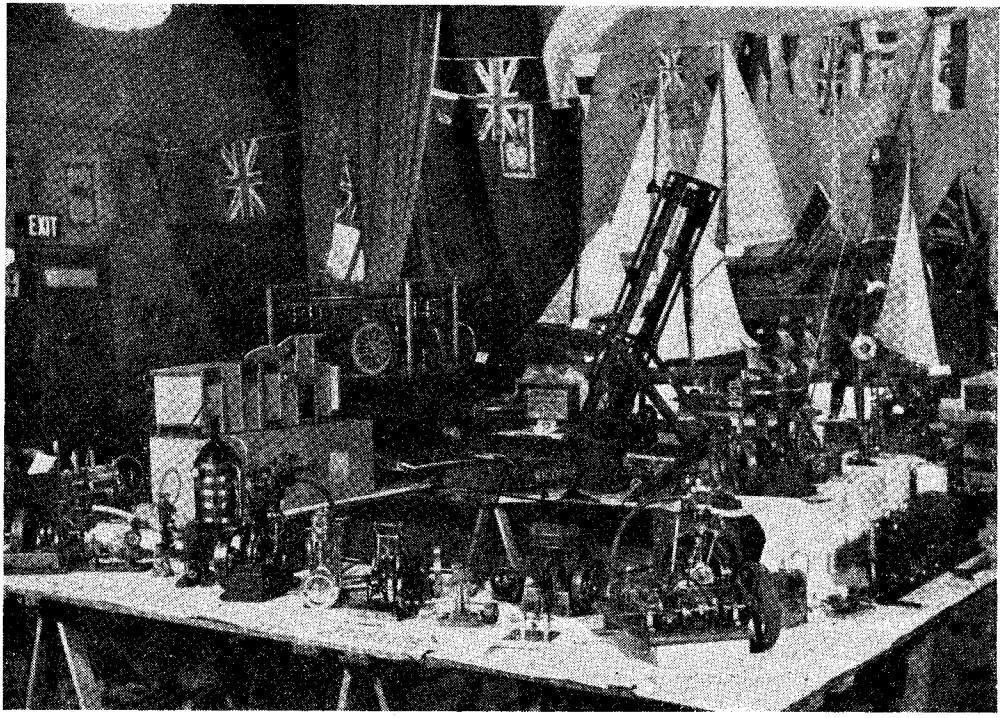
"Unsuitable for Reproduction"

An elementary treatise on how NOT to photograph models

by the Technical Editor

MOST model engineers have a keen interest in photography, and this is quite as it should be, for modelling and photography may be regarded as kindred arts, having much in common both in aims and achievements. They are alike creative, calling for mental inspiration, and skill of eye and hand; and in both cases, the perpetual striving towards a standard of perfection, which is never fully achieved, presents a constant challenge to one's resource and dexterity which keeps up the interest and fascination of the pursuit. Model engineers have also begun to realise that a still closer alliance between the arts is possible, in that the construction of photographic equipment is well within the facilities of the amateur workshop, and the articles on this subject which have appeared in THE MODEL ENGINEER have been keenly appreciated by a wide circle of readers.

Despite these facts, the application of the photographer's skill to portraying model engineering activity still leaves much to be desired, and far too large a proportion of the photographs submitted to us for the purpose of illustrating articles or reports, have to be returned with the sorrowful note "Not suitable for reproduction." It may, in fact, be said that a really suitable print for reproduction is the exception rather than the rule. This state of affairs cannot be blamed entirely on the amateur photographer; only too often, photographs taken by professionals and even Press photographers leave much to be desired.



This picture illustrates the futility of trying to show a large collection of models in a single view

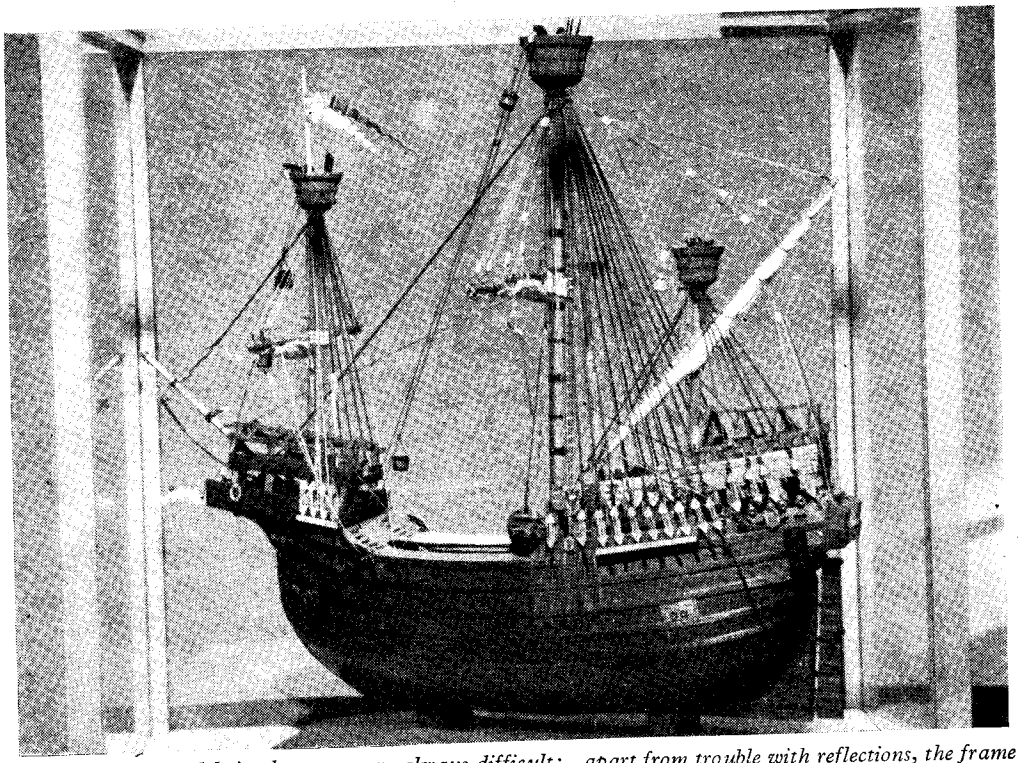
Several articles have been published in past issues of THE MODEL ENGINEER on photographing models, and have given excellent practical advice on how to obtain good pictures of these more than usually difficult subjects. This advice still

holds good, but an approach is now being made from the other end, as it were, showing how *not* to do it (with the aid of a few " horrible examples" picked out at random from a painfully large selection), hoping that thereby the model photographer may be steered past some of the worst obstacles.

What is an " Unsuitable " Photograph ?

It will, of course, be obvious that the worst fault in any photograph, whether intended for technically. As this point has been emphasised by previous writers on the subject, there is no need to deal with it in detail here. The same applies to choice of background, and the exclusion of extraneous detail which might confuse or distract attention from the main subject.

All this, of course, is pretty elementary stuff to anyone who aspires to a practical knowledge of photography, but there are many other points which are equally important, but much less



Photographs of models in glass cases are always difficult; apart from trouble with reflections, the frame of the case gives a cramped effect and conveys the illusion of distorted perspective

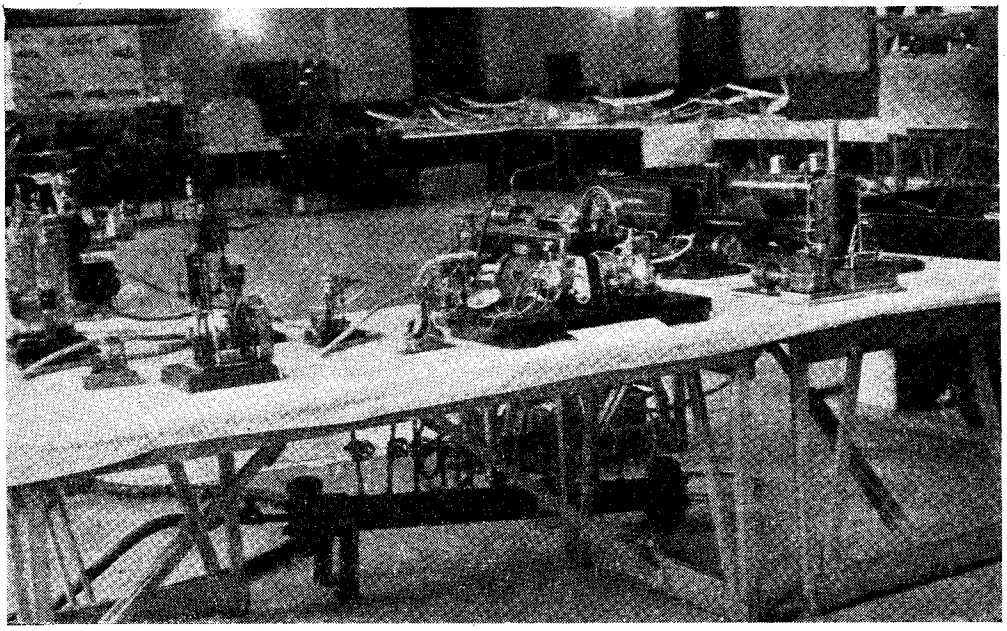
reproduction or not, is poor technical quality ; this term covers all the common imperfections, such as incorrect exposure, bad focussing or unsuitable lighting, either or all of which result in a lack of clear detail, flatness or excessive contrast. But very often, photographs which have no obvious defects in these respects still leave very much to be desired from the aspect now under discussion.

A point of paramount importance in any photograph intended for reproduction in a technical journal is that it should be *informative* ; in other words, it should be an " illustration " in the truest sense of the term, portraying as fairly as possible all the details of the subject from the particular angle of view. And this brings in an equally important essential, the choice of viewpoint, which can make or mar any photograph, no matter how good it may be

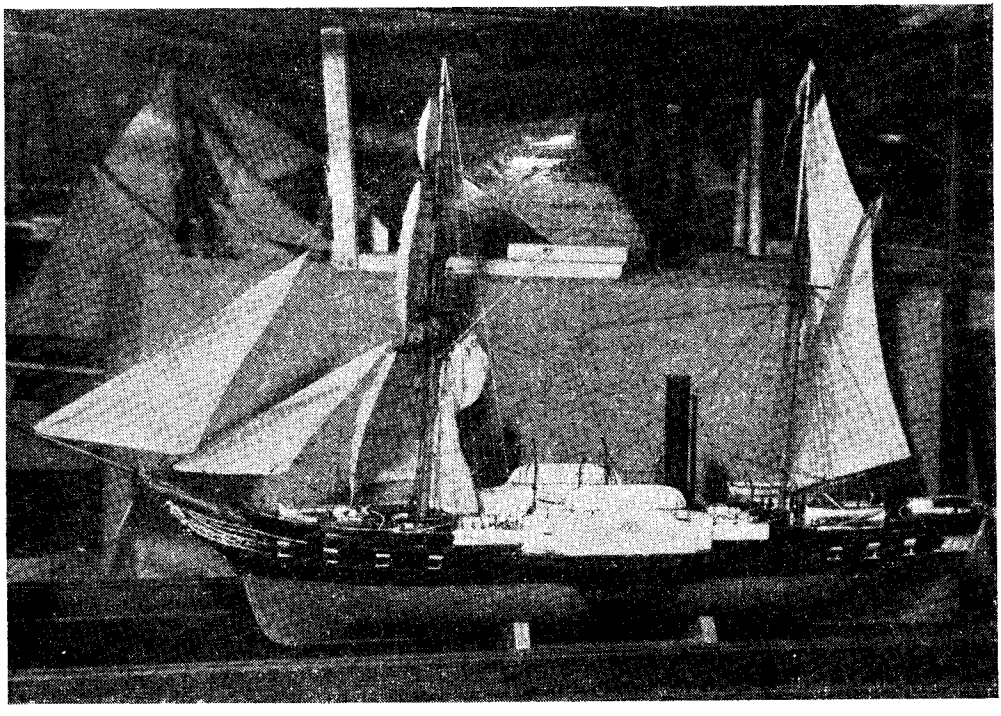
widely appreciated. The first is that when a photograph is reproduced by the usual half-tone process, a certain amount of detail and tone value is inevitably lost, and a print which looks quite clear and bright in the original may look flat and lifeless when it appears in print. In this respect, much depends on the paper on which it is eventually printed, and nearly all journals at the present day have to be printed on paper which would not have been accepted under any circumstances before the war. Thus, the problems encountered by the printer in obtaining even a reasonable reproduction of a picture are tremendous.

Sharp Definition

For this reason, the utmost pains must be taken to obtain prints with real snap and vigour in them, having a full range of tones and the



An untidy picture, with confused subject detail and both foreground and background too obtrusive



This might have been an excellent picture of a model, if only a blank background had been used

sharpest possible definition. This does not mean that they must be highly contrasty : indeed, the " soot-and-whitewash " type of print is one of the worst for the purposes of reproduction, as it lacks the middle tones which are essential to build detail in the picture. The block-maker can control contrast to some extent in the etching of the block, but he cannot put in tone detail which is missing from the original print.

Many prints submitted for reproduction are too small to give the block-maker a reasonable chance of copying them on a scale suitable for reproduction. If the negative is available, it is often possible to make an enlargement from it (in many cases the real subject only occupies a small part of the negative), but a miniature print which looks quite snappy sometimes proves disappointing in respect of definition when considerably enlarged, and the common theory that miniatures can be " blown up " to almost any desired extent is definitely a fallacy.

Choice of Subject Matter

In the case of photographs intended to accompany technical articles, one or more clear pictures of the subject from the best possible viewpoint, and without any embellishments will generally serve the purpose best. Such photographs make a very useful supplement to working drawings, by providing the nearest approach to a three-dimensional representation that is possible within the limitations of a two-dimensional print. If the model is portrayed in action, the inclusion of figures and scenic background is fully justified, but they should always be subservient to the model itself. In many cases, the latter is partially or almost completely obscured, or allowed so small a part in the tableau as to appear insignificant.

Exhibition Photographs ?

Some of the worst pictures submitted to us, from the aspect we are now discussing, are those taken at the many exhibitions in various parts of the country, and sent in as a background to club reports. In some cases, clubs have felt slighted by our inability to use their photographs, but we repeat what we have told them many times in individual cases ; namely, that we are only too anxious to reproduce photographs which do justice to the models, and show them in such a way as to interest the average reader. The following remarks are not intended as a criticism of any particular photographs submitted, but may help the people responsible to avoid the kind of mistakes which are all too frequently encountered.

Groups of Models

First, it should be fully realised that it is almost impossible to get a good reproduction of a photograph which shows a large group of models. The original print may show the individual models quite clearly, and enable a good comprehensive idea of the display to be obtained, but the result in a half-tone reproduction is almost invariably a chaotic muddle. The choice of background in exhibition pictures often leaves much to be desired, and although it is possible to block out the background of a photograph, the amount of time necessary for this operation can often ill be spared, especially in cases where the contour is intricate, such as, for instance, the rigging of a model ship.

" Candid " Shots

In this respect, the photographer who prides himself on his " candid " shots, taken without any preparation of the subject, is not the best type of craftsman for photographing a model exhibition. While the inclusion of figures in exhibition photographs is by no means to be avoided, the remarks previously made about keeping them subservient to the model subject should be given still more emphasis. Exhibition photographs are often taken by the local professional or Press photographer, and although in either case one may be reasonably assured of competent craftsmanship, they very often do not see the subject through the eyes of the model engineer. The professional who specialises mainly in portrait work is very often blind to the technical beauty of a good model, and may photograph it from entirely the wrong angle. The Press photographer often over-emphasises the personal angle, particularly in relation to purely local interest. Some Press photographers are quite incapable of taking a photograph of a model without an accompaniment of an admiring group of small children around it ; and from their point of view, they are perfectly correct, as that is the type of picture which is most likely to interest the non-technical readers of a daily paper.

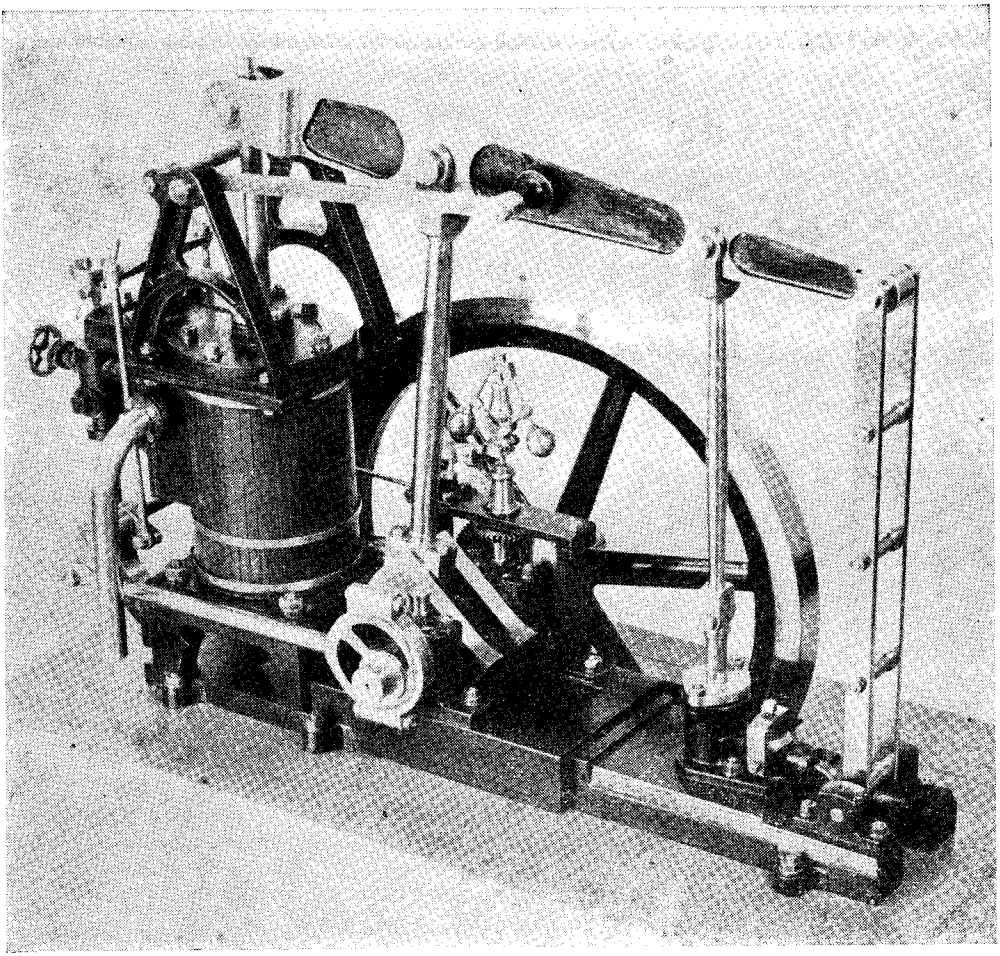
Purely of Local Importance

Photographs taken at the opening ceremony of an exhibition such as those portraying the small daughter of the secretary presenting a bouquet to the Mayoress, are charming in their way, and no-one can deny their local importance, particularly to a club having a worthy civic pride, and anxious to show their worthiness to the authorities ; but it is just not the kind of thing that readers of THE MODEL ENGINEER want to see.

The photographer who takes a picture of a model, whether it be at an exhibition or otherwise, should always put himself mentally in the place of the reader who, although having a keen interest and possibly a good deal of knowledge on the subject of model engineering, does not know any of the personalities connected with the model or the display which he is viewing. Obviously, such an observer has very little interest in purely local circumstances, but wishes to see as much of the details of the model as is possible ; in other words, emphasis is again placed on the need for informative quality.

Rules

One final word on the technical side of the subject ; the rules for good photography have not altered in the last fifty or sixty years, although there have been many changes in modes and methods. The photographer of the old school who believed in small stops, long exposures and making the best of available lighting is as competent to produce good work in this particular



A definitely informative picture portraying technical details well, but marred by excessive contrast and lack of tone values

class as the ultra-modern expert with every gadget under the sun. Moreover, the old idea of "exposing for the shadows and developing for the highlights" is still as sound as ever, and the "arty-crafty" technique of creating impressionistic effects with dark shadows, excellent though it may be for certain purposes, is somewhat out of place on technical subjects.

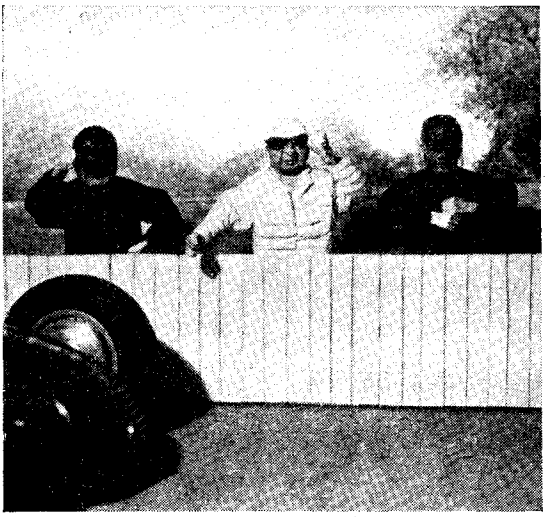
Traction Engine Photographs

We have been favoured with a copy of a further list from Locomotive & General Railway Photographs, Merope, Trevone Bay, Padstow, Cornwall, giving particulars of numerous recent additions to their collection of photographs of road locomotives, rollers, etc. There are no fewer than 98 additional subjects, including products of Aveling & Porter, Bomford & Evershed, Burrell, Foster, Fowler, Garrett, Marshall and Wallis & Steevens, some of them being reproduced from catalogue illustrations. Among some miscellaneous subjects we note Straker steam buses, Ro-Rail buses and the Ro-Rail Karrier lorry.

The list is No. 118/1 and will be sent from the address given above, upon receipt of a 2½d. stamp, and we commend it to the attention of readers interested in road locomotives.

*MINIATURE GRAND PRIX RACING

by G. W. Arthur-Brand



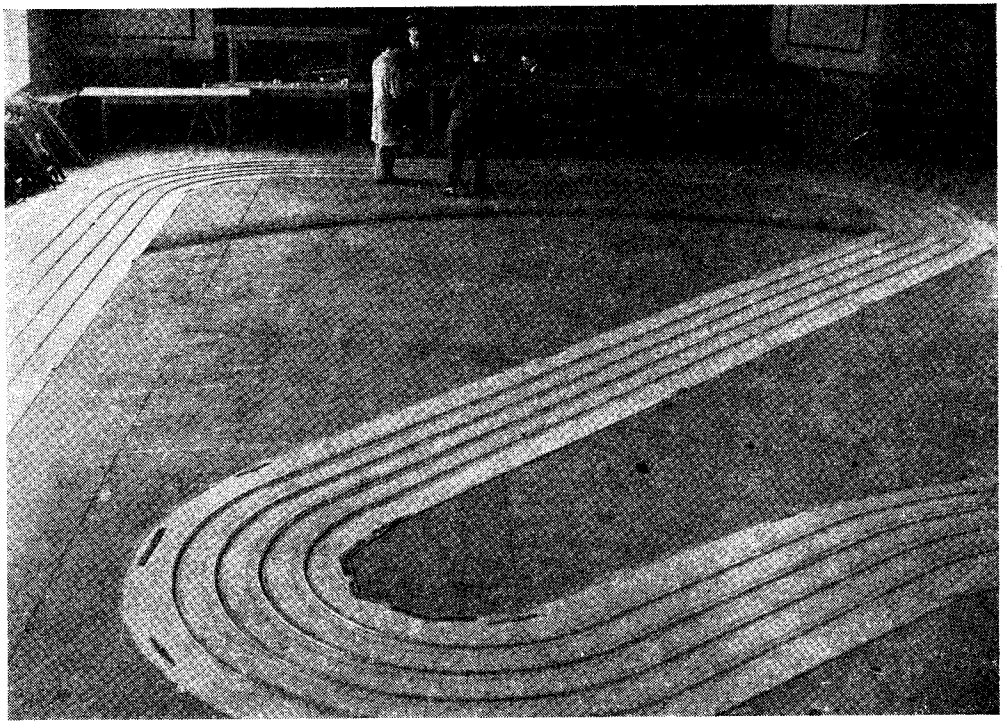
No comment!

DOWN at the Medway Model and Experimental Engineering Society's annual exhibition recently, I was pleased to see a miniature G.P. circuit in full swing, with the cars performing very nicely and returning some most impressive speeds into the bargain. Well done, Medway!

Last week we discussed cars and some of their more essential details; let us now examine the track situation, so that everybody might get a fairly clear picture of how best to go about laying a circuit.

As mentioned previously, by far the most spectacular layout, from the point of view of

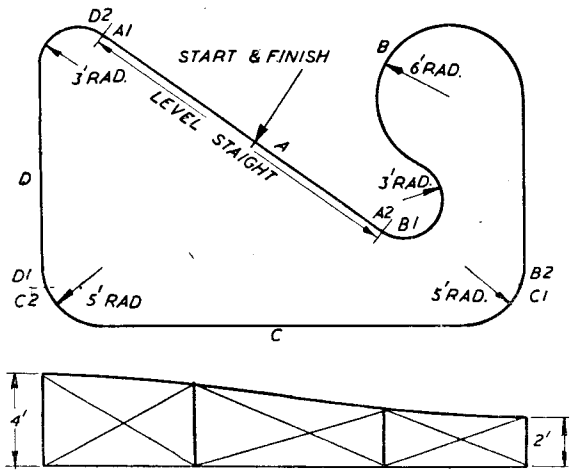
*Continued from page 515, "M.E.," October 18, 1951.



A section of the Meteor circuit

both the participant and the spectator, is the "elevated." This, however, entails proportionately more work and expense, plus storage space, so we will concentrate for the moment on the flat, ground-level layout.

Obviously, the first and all-embracing factor is—how much room have we available and what facilities for storage between meetings? In considering space, we must not lose sight of the fact that the odd posts or columns are no detriment to this system, and might well improve matters! However, we decide on space and practical size of circuit and we turn our attention to storage. All I can tell you here is that, from a generous estimate, a 150 ft. circuit will stow away in a space of 10 ft. × 5 ft. × 4 ft.



Figs. 5a and 5b. In section A1-A2, the level straight is 4 ft. above ground level. In section B, from B1 to B2 there is a gradual descent from 4 ft. to 2 ft., the height at C, after which from D1 through D to D2 the circuit rises again to the maximum of 4 ft. Direction of rotation is clockwise

Whatever circuit you choose, try to make it as interesting as possible, with not too many parallel sides. The Stoke and "M.E." Exhibition circuits are difficult to improve upon, and for this reason, as well as to satisfy the demands of a large number of readers, the general plan view is given here (Fig. 5). If, on the other hand, you are lucky enough to have unlimited available space, there is no end to the complexity of the circuits you may adapt, from the purely imaginary variety to true scale models of the well-known Grand Prix circuits.

Now for our next consideration—what material for the surface or base, and how thick? All the tracks to date, that is, as far as I know, have been laid on hardboard, and as an easily workable, strong and readily obtainable commodity, this would seem hard to beat. Two other important points in favour are (*a*) it has a most satisfactory surface and (*b*) it is manufactured in sizes which allow curves and bends to be incorporated with a minimum of labour. As to thickness, $\frac{1}{8}$ in. is the minimum, while anything over $\frac{1}{4}$ in. would tend to be too heavy; so for the sake of economy, plumb for the thinner gauges.

Figs. 6 and 7 show the method employed by the Stoke club to join their sections together, and a very effective method it proves to be. Perfect lateral and longitudinal rigidity are ensured, with rapid assembly and dismantling following hand in glove. By using cheap commercial hinges, much time and labour can be saved, and I doubt whether a more practical system could be devised.

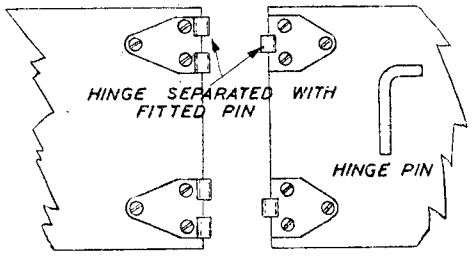


Fig. 6

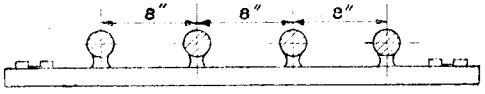


Fig. 8

For the rails, either round bar or tube may be used, with, I think, identical results, so it will rest with you which is employed. My own, personal preference is for the bar, but I warn you, it entails a lot of tapping!

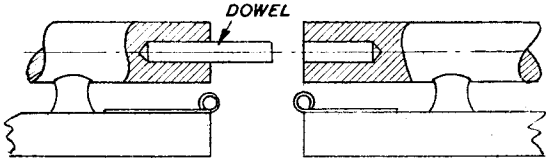


Fig. 7

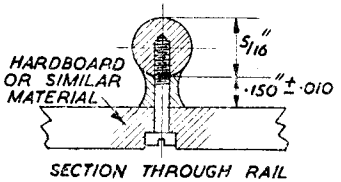
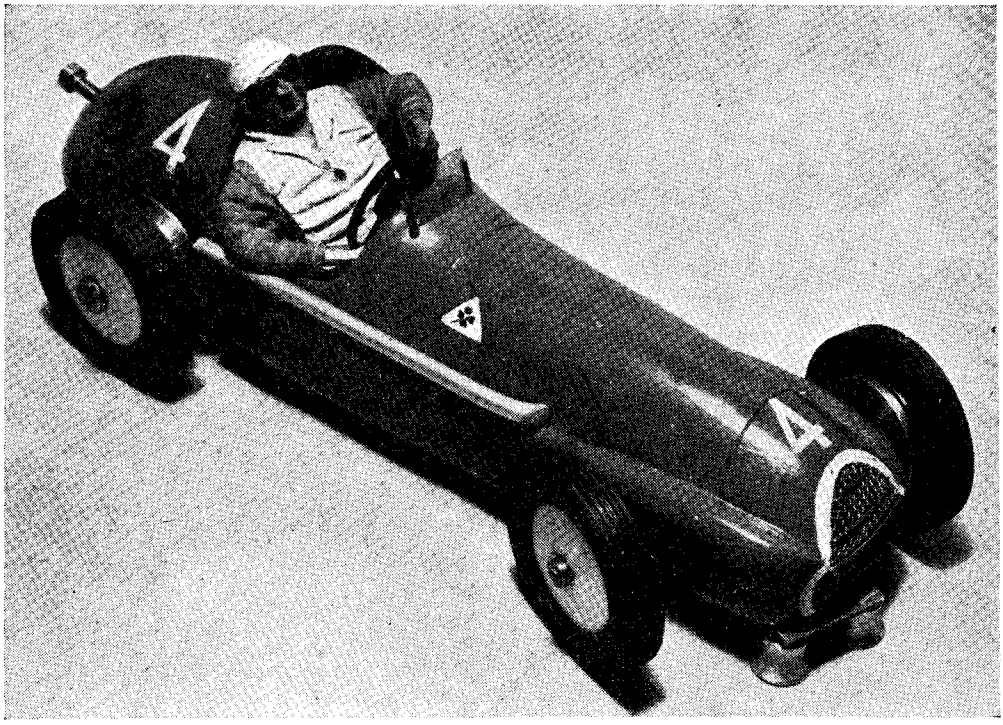


Fig. 9



The lifelike drivers add considerably to the atmosphere of miniature G.P.!

From the sketches in Figs. 8 and 9, it will be seen that the rails are raised above the base or track surface by a number of low stauncheons, spaced roughly at 12-in. intervals. These, happily, are obtainable from Messrs. Henri Baigent Ltd., Hut 200, Hurn Airport, Christchurch, Hants, at a very modest cost per hundred. Mr. Baigent informs me that he will be pleased to forward price lists of parts and spares to all interested readers.

Let us now assume that at least some of our readers can spare the space, time and cash for an elevated circuit. Fig. 5b shows briefly the method of staying the trestles, and in this case union of the sections is accomplished by bolting the adjoining legs of the sections together, thus doing away with the necessity for fitting the half-hinges and pins.

We found that the stipulated heights of 2 ft. for the lower level and 4 ft. for the upper, giving a rise and fall of 2 ft. on the gradients, were ideal for a medium sized circuit. Variety can be introduced by shortening or lengthening the hills as desired.

Unquestionably, the ideal circuit would be a permanent one, laid out of doors, the surface being thinly laid macadam over a concrete base carrying the rails. The scenic effects could then be most convincing and would add considerably to the enjoyment of running.

I can hear my critics crying out "toys, kids' stuff," but for every sceptic I am sure there are large numbers of true model engineers who welcome this new addition to our hobby as a decisive step forward in model car development.

It has been my aim in this short series to introduce Miniature Grand Prix racing to readers of THE MODEL ENGINEER. If by the few words I have written, coupled with the photographs and drawings, I have been able to kindle a small flame of enthusiasm, then I shall feel that my time has not been wasted.

In future issues I hope to publish further constructional articles by some of the pioneers, bolstered by a special "M.E." design for a Miniature G.P. car. In the meantime, should any reader require further information on the subject, I hope he will not fail to write to me; I shall be only too delighted to help!

Lastly, a word or two about the future of Miniature Grand Prix racing and its prospects of recognition as an established branch of our hobby.

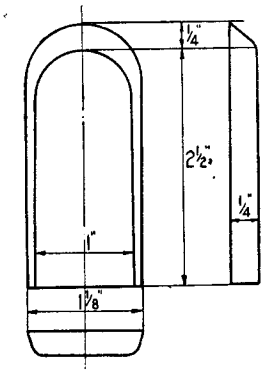
As we go to press, word has been received that the Model Road Racing Association is going all out for recognition, and that it is hoped the R.A.C. will accept its invitation to become the governing body of the Association, in much the same way that the Royal Aero Club functions in relation to the S.M.A.E. This would, of course, place the movement on a sound footing and would ensure that competitions receive adequate organisation and control.

The Model Road Racing Association is to be applauded for its eagerness to establish an early and adequate connection, and I am sure that my readers will join me in wishing those responsible every success.

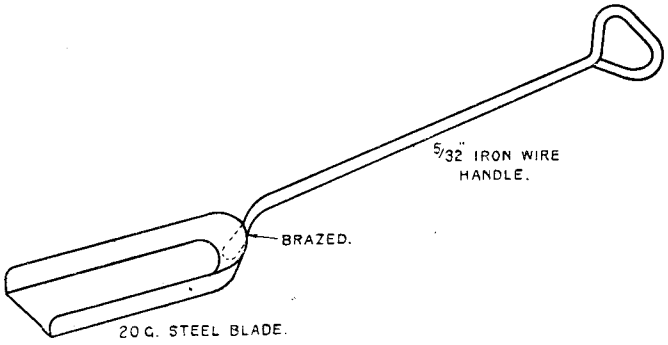
"L.B.S.C.'s" Beginners' Corner

Accessories for "Tich"

SOME of our beginner friends who have visited club and exhibition tracks, have noted that the accessories such as firing tools, oil feeders, etc., even on well-made locomotives, seem to have been added as an afterthought, any old thing that happened to be handy, being pressed into service. One beginner told me that he saw a really fine engine being fired with an improvised salt spoon, and oiled with a battered relic which had evidently once been used on an ancient sewing-machine. These "spring-sided" oil-cans could, at one time, be bought at any ironmongery store for the princely sum of one penny! Anyway, it is now suggested that a note or two on really locomotive-like gadgets suitable for small engines, would be acceptable to our beginner friends; and as this is your own column, and you call the tune for the words and music, here goes to oblige.



Former for fireman's shovel



The finished shovel

Firing Shovel

The kind of shovel which I use on my own engines, has a blade of the same shape as used in full size, but a longer handle is necessary, as the fireman doesn't ride on the footplate. The first thing needed is a small iron former, similar to that used for flanging boiler plates. Make it of ¼-in. iron or steel plate. It is only a few minutes' work to saw out the plate, and file it to shape; and once made, you can make shovels galore on it, if they should be needed. The shape and dimensions of a former for a shovel which is suitable, not only for *Tich*, but nearly all 2½ in. and 3½ in. gauge locomotives, are shown in the illustration. Note that the sides and back are bevelled off. The size may, of course, be varied if desired.

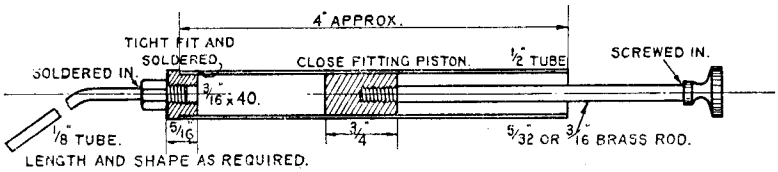
The blade is knocked up from a piece of 20-gauge steel. Lay the former on the bit of sheet steel, and mark a line all around, a full ¼ in. from the edge, except at the narrow straight part. Cut it out—easily done with hand snips—clamp in vice jaws alongside the former, and proceed to beat down the projecting edges of the steel; but here, you'll find things slightly different from flanging a copper plate! As fast as you hammer down one part of the flange, another bit of it will bob up again, and you'll probably find that you have a row of crinkles instead of a smooth flange. Well, don't worry; just keep on pegging away at the crinkles, hammering them down as fast as they come up. In the end, they'll get tired of it and give you best, and you will have a nice flange all around the former. The edge of the flange will be rather ragged, but a file will soon teach that good manners. Round off the front corners of the shovel blade as shown.

The handle is made from iron wire—black, tinned, or galvanised; doesn't matter a bean—about 5/32 in. diameter. I make mine about 6 in. long, but you can make yours to suit your own ideas. Bend one end into a flattened ring, as shown in the perspective sketch. Hold the other end on something solid, such as an anvil, block of iron, or similar, and give it a few hearty biffs with a hammer, to flatten it. File off any raggedness, and make a slight bend at the end of the flattened part, as shown.

Put the blade upside down in the brazing pan, set the handle against it (I usually prop mine up with a few bits of coke) apply some wet flux, blow to bright red, and touch the joint with a bit of soft brass wire, which will melt and flow in. Let cool to black, quench in water, knock off any burnt flux which may be sticking to the handle, and there is your shovel. The angle of the handle may be anything you like; just bend it to suit the engine.

Uninitiated readers of the present generation

may be amused to learn that the fireman's shovel was, in the really good old days, the principal footplate cooking utensil. The blades were always clean and bright, and in those happy times when we could get as much bacon, meat, etc., as we wanted, enginemen used to fry big rashers and grill huge steaks on the shovel, holding the blade just inside the firehole door. Just fancy—a juicy rasher about ¼ in. thick, two new-laid eggs, the top of a cottage loaf, about a quarter-pound of fresh butter, a big can of tea, and plenty of time to sit down comfortably in the cab and enjoy it all, before it was time to take the next train out; kind of makes your mouth water, doesn't it? Enginemen of my generation never had any canteens, hostels, etc., and didn't need any. I've attended banquets, in days gone by, at the Cafe Royal in Regent Street, London, and other swell places, but give me the merry old alfresco footplate lunch every time—it makes you feel equal to pulling the train without any engine!



Oiling syringe

Oiling Syringe

The driver of a full-sized engine can go underneath with his oil-feeder, and put a drop of oil wherever it is needed; but it would puzzle the driver of a small one to follow suit. As I've often remarked, you can't "scale" Nature! The only thing to do, is to use some more convenient method of putting the oil where you need it. A commercial pressure-feed oiler with a piece of thin tube soldered into the end of the spout, is quite a good wheeze; I have three of them, each holding a different grade of oil. However, these oilers are now fairly expensive, and here is a drawing of a simple syringe-type oiler which will do the necessary just as well. Any beginner should be able to make one inside of half an hour. The sizes given, may of course be varied to suit any oddments of tube and rod, that you may have handy.

The barrel is a piece of ½-in. brass or copper tube, squared off at each end, in the lathe, to an approximate length of 4 in. Treblet tube is best, as it is smooth inside; but if ordinary tube is used, and the inside is roughened, as it usually is, wind a piece of fine emery-cloth around a stick, until it will just go in the tube. Chuck this in the three-jaw, put the tube over it, run the lathe as fast as possible, and run the piece of tube up and down the improvised lap. Very little of this treatment is needed to smooth the inside of the tube.

To make the piston, chuck a piece of ½-in. brass rod in the three-jaw. Face the end, centre, and drill down about ¼ in. with No. 30 or 5/32-in. drill; tap either 5/32 in. × 40, or 3/16 in. × 40. Turn down a little over ¾ in. length, to a close sliding fit in the tube, same as if you were fitting a steam piston, then part off at ¾ in. from the end. Should there be a wire-edge left after parting off, chuck the piston again, plain end outwards, and chamfer the end just sufficiently to remove the sharp edge. Chuck the piece of rod again, repeat the facing, drilling and tapping processes, then turn the outside to the shape of a knob as shown; and part off. The piston rod is a piece of 5/32-in. or 3/16-in. brass rod about 3½ in. long. Chuck in three-jaw, face off and screw about ¼ in. at one end, and about ⅛ in. on the other. Screw the knob tightly on to this end whilst the rod is still in the chuck, and chamfer the knob a little, so that there won't be any sharp edge to cut your fingers. Screw the piston on to the other end.

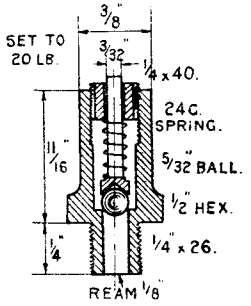
For the end cap, chuck the piece of ½-in. rod once more, and turn down 3/16 in. of it to a tight squeeze fit in the end of the tube. Part off at 5/16 in. from the end. Re-chuck by the reduced part; centre the end, drill right through with 5/32-in. drill, and tap 3/16 in. × 40. Skim off any burr. Press the cap into the tube, and solder it in as an extra precaution. Drop a bead of solder down the tube, plus a few spots of Baker's fluid, or any other good liquid soldering flux; heat over a gas or spirit flame, holding the tube with a pair of pliers, almost vertically, so that the flame heats up the cap. In a minute or two, the solder will melt and form a nice fillet all around the end of the cap inside the tube. Wash well in running water, to remove all traces of the soldering flux, which naturally wouldn't be much good for lubricating purposes!

The nozzles can be made from ⅛-in. or 3/32-in. tube, to suit different types of locomotives. For an engine like *Tich*, two would be plenty; one with a short tube, and one with a long tube. Chuck a piece of ¼-in. hexagon rod in three-jaw, face the end, turn down ¼ in. length to 3/16 in. diameter, and screw 3/16 in. × 40. Part off at ¼ in. from the shoulder. Reverse in chuck, centre, drill right through with 3/32-in. drill, and if ⅛-in. tube is used for the nozzle, open out to ⅛ in. depth with No. 32 drill. Chamfer the corners of the hexagon. Cut a piece of tube the length required for the spout, and silver-solder it into the nipple, heating the tube full length to soften it. Pickle, wash, clean up, screw the gadget into the hole in the cap, and you're all set. To use, pull the piston right out, pour some oil into the tube, replace piston, and press the knob very gently when applying the end of the spout to the part needing oil. The spout, being soft, can be bent as required, to oil around the corners, and get at every moving

part. To prevent leakages, the end of the spout can be screwed, and a little blind cap made to fit it. If this is screwed on when the syringe is not in use, no oil will escape, and make a mess on the bench, or wherever you keep the syringe.

Automatic Steam Raiser

This gadget is especially useful to anybody who steams up a locomotive singlehanded, and cannot get a helper to operate the tyre pump of an auxiliary blower of the kind I have already described, and has no source of current near the line, by which an electric blower could be operated. The sectional illustration shows the whole bag of tricks at a glance; it is simply a small self-contained steam boiler built around an extension chimney. Dere vos a leetle bit of Ikey McTavish in it, ye ken, as it utilises some of the heat from the engine's own fire, to keep the pot boiling. Any beginner can make it in a matter of an evening, without any trouble at all.



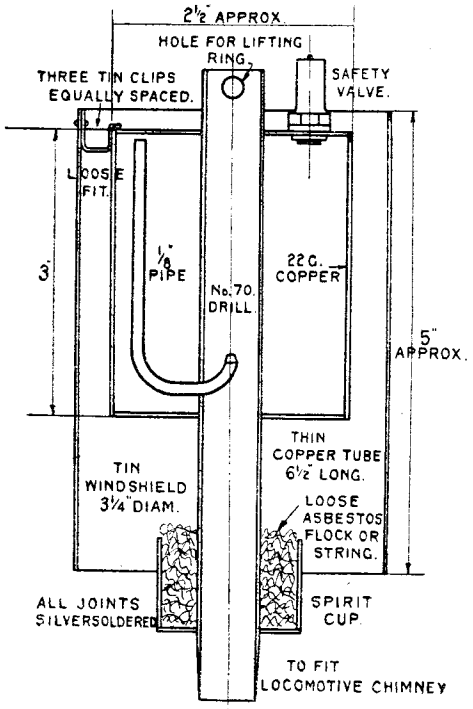
Safety-valve for blower boiler

A piece of tube about 6½ in. long will be required for the actual extension chimney; this should be of such a size, that when bevelled off at the bottom, it will fit fairly tightly into the engine's chimney. Drill a ⅛-in. hole about halfway up; and in it, fit and silver-solder an inverted swan-neck of ⅛-in. copper tube, the short end of which has been closed up by hammering all around, and then drilled No. 70. The actual boiler is made from thin copper, say, 22-gauge, as the working pressure is very low. If a piece of thin 2½ in. diameter tube isn't available, roll up a bit of thin sheet, put a couple of rivets in it, and silver-solder the joint. Cut out two discs of same gauge copper for the ends, and drill the centres a tight fit for the chimney. Silver-solder one end into the boiler barrel, then push it on the chimney tube from the bottom, until the upper end is about ⅛ in. above the steam pipe. Before fitting the top plate, drill a ⅜-in. hole in it, and fit a ¼-in. × 26 tapped bush for the safety-valve; then put the end plate on, silver-solder it to the barrel, and silver-solder the end plates to the chimney.

The spirit cup will need a 1 in. length of 1½-in. thin copper or brass tube, or a piece of thin sheet metal rolled up and silver-soldered, same as the boiler. A bottom plate is cut out, and silver-soldered to the round part, and this also has a hole drilled in it, to fit the chimney. It is placed in position just above the tapered end of the chimney, as shown in the illustration, and silver-soldered in place.

The safety-valve is a smaller edition of the one fitted to the larger *Tich* boiler. It is made from ½-in. hexagon rod; the hole through the screwed part is reamed ⅛ in., the ball is 5/32 in. diameter, either bronze or rustless steel, and the upper part of the valve is drilled and D-bitted 7/32 in., and tapped ¼ in. × 40, a nipple being made from ¼-in. round rod, to suit.

For getting up steam in the open air, a windshield will be needed. If you have an old empty coffee or cocoa can about 3¼ in. diameter, or a little larger, it will save rolling up a piece of tin or thin sheet iron specially for the job. Just cut the end off with the domestic can opener, and remove any jags either with a file, or by trimming the end with the snips. Then bend



Automatic blower for steam raising

three ¼-in. strips of tin, to the shape shown in the illustration, and rivet them at one end, spacing them equally. The U-bends keep the shield central with the boiler, and the lips at the ends of the bends prevent the whole issue falling down. Finally, drill a hole through the top of the chimney, and put a wire ring through it.

How to Use It

Have your supply of charcoal, etc., all ready for lighting up the engine's fire, as specified in a previous instalment. Fill the boiler about half full of water (preferably hot, as it is not only quicker, but saves spirit, says Ikey McTavish again) and screw in the safety-valve. Put some loose asbestos flock or string in the spirit cup, and fill it nearly to the top with methylated spirit. Put the whole lot on the engine's chimney, place the tin shield over it, and light up the spirit cup. While the water in the boiler is heating up, you can be putting three or four shovelfulls of paraffiny

(*Continued on page 548*)

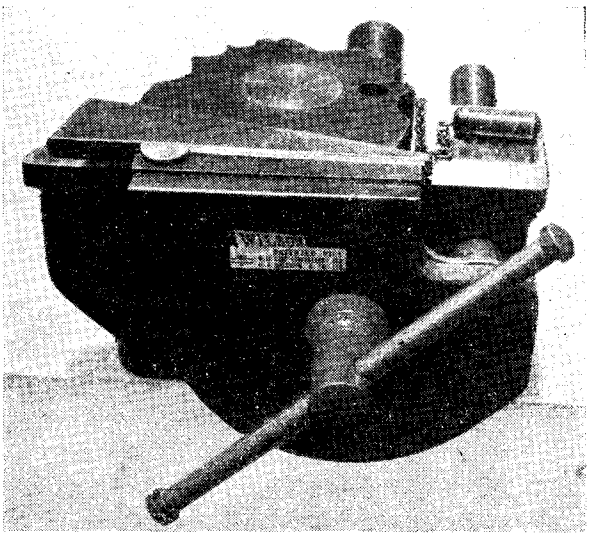
THE OLYMPIA EXHIBITION

TO give it its full title, this exhibition was staged under the name of the Engineering, Marine and Welding Exhibition, and although this necessarily covers a wide field, many exhibits were seen that would appeal to those interested in general engineering as well as in some of the more specialised branches of the industry.

The interests of the model maker were not neglected, and many beautiful ship models were on show on the stands of world-famous ship builders and, in addition, there were outstanding scale models of ships' steering gears, winches, and donkey engines.

The full-size diesel marine engines, such as the large Crossleys, were most beautifully finished and instructively displayed, with the working parts open to view, as the crankshafts were turned by an auxiliary motor. Numerous electrical installations were shown, and the application of radar as a means of ship control was also demonstrated. As was to be expected, a special section of the exhibition was devoted to welding plants, but these were mainly of the large and expensive commercial type and were, therefore, not within the scope of the small workshop. The large lathes of elaborate design were beyond the needs of the modest workshop, and the same may be said of the milling and shaping machines examined. However, on the stand of Messrs. Meddings a representative selection of the Pacera drilling machines was studied with much interest, for the machines of $\frac{1}{2}$ in. and $\frac{3}{4}$ in. capacity, with self-contained motor drive, appeared to be outstanding by reason of their fine finish, robust construction, and ease of handling. The larger, ten-speed, machine would certainly be a most useful tool in any workshop where a great variety of drilling and similar subsidiary operations were carried out. One of the machines seen working had been partly sectioned to show the construction of the spindle mounting and the details of the feed gear. Another machine was in operation to demonstrate the easy method of engaging the backgear by means of a small lever mounted on the side of the headstock, and, with this gear in action, the machine ran remarkably quietly.

Of the smaller tools exhibited, the Blending Machine Co., of Bond Street, Birmingham, have a new and ingenious type of bench vice, known as the Wilson, that will hold securely most forms of irregularly shaped material. The vice has an all-steel body, and the movable jaw is carried on two ground slide bars that give accurate guidance even when the vice is fully open. A brass clam is pivoted on one of the guide bars and can quickly be brought into position when required to protect the work. The fixed jaw consists of a block furnished with a horizontal V-groove, as well as with a series of vertical grooves for gripping work of various shapes and of tapered form. This jaw can be rotated as required by withdrawing a locking-pin, and with this arrangement of the jaws a long rod can be passed between the jaws and held vertically.

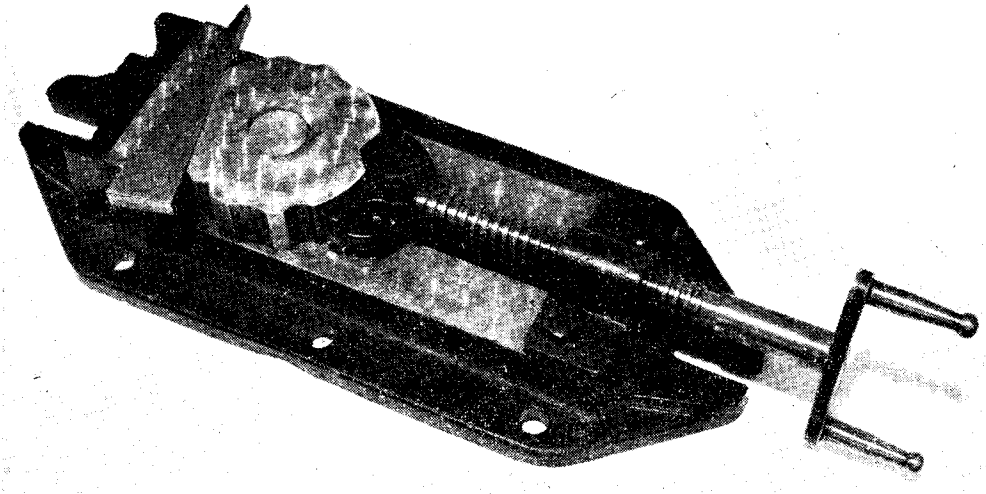


The Wilson universal bench vice

The same firm also showed an all-steel machine vice furnished with a pivoted loose jaw for holding both parallel-side and irregular work. The fixed jaw is, here, machined with a horizontal V-groove, but some workers might prefer a flat-faced, fixed jaw for gripping and accurately locating the work when drilling.

House decoration seems to have become popular recently amongst amateur workers as a result, perhaps, of the high cost of painting. For this work, there is no quicker or easier way of distempering and painting than by using a small spraying outfit with a power-driven compressor. Messrs. Aerostyle of 170, St. John Street, London E.C.1. showed a comprehensive range of compressors driven by electric motors of from $\frac{1}{4}$ h.p. to 5 h.p. ; in addition, some models are supplied powered by petrol engines.

The three smaller units, having outputs of 2 cu. ft., 3 cu. ft., and 4 cu. ft. per minute, are well-suited to the needs of the home decorator, but a supply of compressed air is often useful in other ways ; for example, blowing up the car



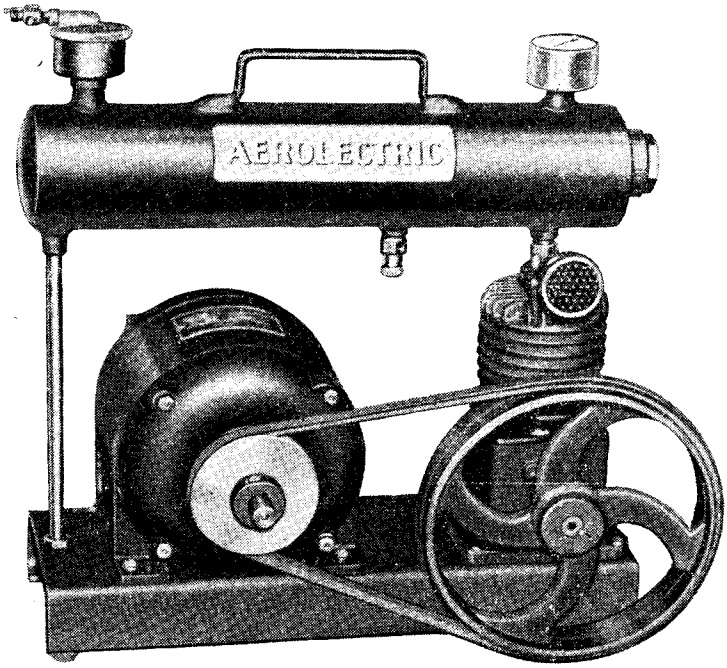
The Wilson machine vice

tyres, creosoting woodwork, or spraying fruit trees.

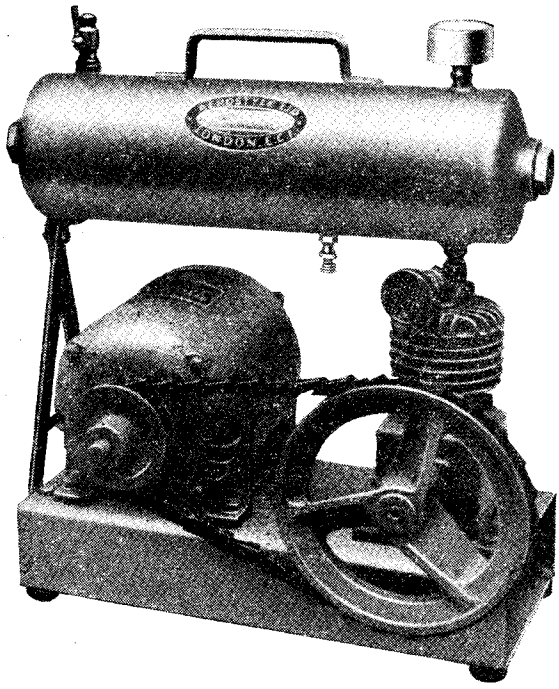
The dial test indicator is, nowadays, regarded as indespensable in most workshops, as it enables work to be checked and components to be set up in machines with great accuracy and without waste of time. In this connection, Messrs. Mercer of St. Albans specialise in the manufacture of these instruments, and as this firm was making chronometers nearly a century ago they have every advantage in the production of fine mechanical movements. The indicators and attachments shown are suitable for a large variety of purposes, and many different sizes are manufactured with dials ranging from 1 in. to 4 in. in diameter. It is noteworthy that some of the more expensive instruments have dials graduated to read in hundred-thousandths of an inch. The No. 90 model is of particular interest to amateur workers, as the holding rod fixed to the case is of $\frac{1}{4}$ in. diameter and enables the indicator to be mounted in the pillar clamp of a standard surface gauge.

As in the well-known Starret type of indicator, the plunger projects from the back of the instrument, and this form of construction will be found most convenient for lathe work or for many operations commonly carried out on the surface plate.

It is hardly necessary to stress the importance



The Aerostyle 2 cu. ft. output compressor unit



The ½ h.p. unit with an output of 3 cu. ft. per minute

of regular lubrication in machine maintenance, and a well-designed lubricator, instead of a simple oil-hole, makes this work easier, and at the same time keeps dirt and chips from entering the bearing. Messrs. C. Weston, of Pendleton, Salford, showed a variety of lubricators suitable for fitting to different types of bearings; these ranged from elaborate sight-feed oilers to the simple Bennet nipple with a ball seal. In the spring-lid oilers manufactured by this firm, the lid can be rotated after the lubricator has been screwed into place; this saves having to fit a packing washer in order to bring the lubricator into a convenient position for service with the oil can.

"L.B.S.C.'s" Beginners' Corner

(*Continued from page* 545)

charcoal into the engine firebox. As soon as the blower begins to operate, throw a lighted match into the engine firebox, and add more charcoal, putting some coal on when the charcoal is fully incandescent; or if preferred, keep adding charcoal only, until the engine has enough steam to work her own blower. As soon as a few pounds shows on the steam gauge, open the engine blower, and if you can hear it hissing up the chimney, the steam raiser's turn of duty is over. Lift it off the engine's chimney by aid of a piece of stiff rod, the end of which is bent into a hook that will engage with the wire ring on the chimney of the steam-raiser. A stand can easily be made for the latter, after the style of the domestic candle-stick; merely a flat plate, of any shape, with a socket soldered in the middle. Put the bottom end of the steam-raiser's chimney in the socket, and it will stand up straight.

The same steam-raiser can be used for various diameters of locomotive chimneys, by making adapters from bits of tube, the upper ends being bored to fit the bottom of the steam-raiser's chimney, and the lower ends made to fit the chimney of the engine on which the gadget is to be used. For small diameter chimneys, such as on a gauge "I" engine, a piece of smaller tube can be stuck into the bottom of the steam-raiser's chimney, telescope fashion, and for larger ones, a tapered socket can be made to fit over it. The amount of spirit needed to get steam up in the locomotive, without burning a lot to waste (spirit costs muckle siller nowadays, ye ken!) can easily be found by experiment, and should be arranged so that the cup dies out when the locomotive gauge shows about 10 lb. As all the products of combustion of the locomotive fire have to pass through the chimney, and the latter passes through the steam-raiser boiler, it is easy to see where Ikey McTavish comes in! As a matter of fact, there is often enough heat (depending on the size of the locomotive firebox) to keep the blower going strong without the spirit cup being alight at all. The experimenta one that I made, kept going quite well in the chimney of a 4-6-2 with a big firebox, after all the spirit had been consumed. This steam-raiser is not only useful for coal-fired locomotives, but for oil and spirit-burners as well. As I have pointed out before, there is no natural draught through the firebox of a small engine; and even taking the smokebox front off a water-tube boiler's outer casing, only prevents the burners becoming kind of "suffocated," and doesn't help the draught any. If you apply some means of creating the draught, the burners can get all the air they need for perfect combustion; oil burners won't smoke, and "poison-gas plants" will not be able to give off the noxious fumes which gave them the nickname, besides getting up steam in a fraction of the time.

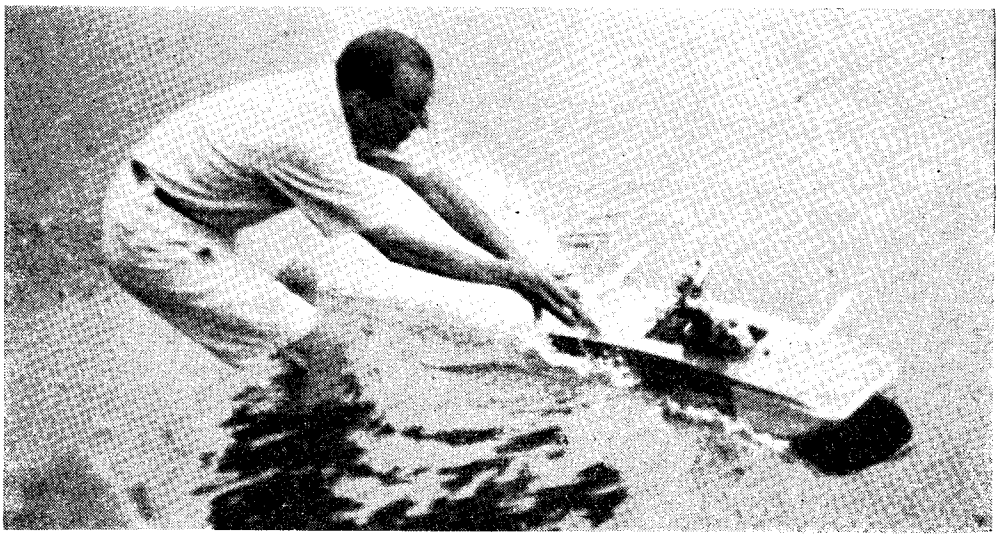
The Paris International Regatta

WE are indebted to M. Gems Suzor for the following report of this event which was organised by the Model Yacht Club de Paris and held at Le Vesinet near Paris.

Competitors came from many different countries, including Swiss and English teams. Twenty-one boats in all were entered including four in the 30 c.c. class. Fortunately, the weather was fine and conditions good for high speed, but owing to the impossibility of making any preparations previous to the day of the regatta, the installation of the launching pier and other necessary arrangements were not completed early enough to start at the proper scheduled time. The result was a general dislocation of the programme and some competitors were unable to have their full allotted runs.

We in Paris, not having a pond permanently at our disposal like those existing in England, were thus at a great disadvantage, but in spite of these handicaps, the regatta as a whole was very successful.

M. Jean-Louis Chevrot with "Folbrise VII." (10 *c.c. class*)



M. Gems Suzor starting his 30 *c.c. boat "Nickie VIII"*

The English team were lucky enough to win first place in all events, and also one second place. Very good speeds were attained, as may be realised from the fact that the boat which took ninth place reached a speed of not less than 90 km. p.h. Mr. George Stone's *Lady Babs II* was first in the 10 c.c. class with a speed of 120 km.p.h. (just 1 km. less than his Geneva performance), but after this splendid run he wrecked his engine due to a capsize. However, he had the luck to record the best lap speed of the day, but his boat was unable to complete the course.

In the 30 c.c. class, Mr. E. Clark made a great impression with his boat *Gordon III* and won the race at more than 100 km.p.h. The runners-up in this event were Mr. K. Williams with *Faro* and Mons. George Suzor with *Nickie VIII*.

The events closed with a dinner arranged at the Hotel des Troismarches at Le Vesinet, during which the prizes were distributed.

Mr. E. Clark with his 30 c.c. boat, "Gordon III"

Results

10 c.c. Boats

1. G. Stone, *Lady Babs II*: 74.6 m.p.h. (English)
2. J. L. Chevrot, *Folbrise VII*: 69.8 m.p.h. (Swiss)
3. F. Chevrot, *Zizi*: 65.5 m.p.h. (Swiss)
4. J. L. Chevrot, *Folbrise VIII*: 63.6 m.p.h. (Swiss)
5. Cartier, *C.O.B.*: 57.7 m.p.h. (French)

30 c.c. Boats

1. E. Clark, *Gordon III*: 62.5 m.p.h. (English)
2. K. Williams, *Faro*: 57.7 m.p.h. (English)
3. G. Suzor, *Nickie VIII*: 48.5 m.p.h. (French)

Machining Worms to Mesh with Gears

Based on the Diametral Pitch System

SEVERAL contributors have at various times described worm-drive fine-feed attachments for the lathe, and sundry other devices requiring a worm to mesh with an existing wheel; but it does not appear to be generally known that such worms can be cut to a very close degree of accuracy in the lathe.

For example, take the case of a worm to mesh with a 20 D.P. gear. Now 20 D.P. means that the tooth proportions are such that a 20-tooth gear will have a pitch diameter of 1.000 in. Hence we can deduce that the actual circular pitch of the teeth is $\frac{\pi}{20}$ in. = 0.15708 in.

Now we are usually advised to set up for 6 t.p.i. for a worm of these requirements, and it doesn't take us long to calculate that this is equal to 0.16667 in. pitch. We have thus an error of 0.00959 in. per tooth, or almost $\frac{1}{16}$ in. per 1 in.

But to return to our fraction of $\frac{\pi}{20}$. Let us substitute $\frac{22}{7}$ for π, and write down $\frac{22}{7} \times \frac{1}{20}$ By cancellation, this equals $\frac{11}{7} \times \frac{1}{10}$ So we pick out our change wheels for 10 t.p.i. (= 1/10 in. pitch) and add in to the train two gears in the ratio $\frac{11}{7}$. We can use $\frac{55}{35}$ or, if our wheels are multiples of 4, $\frac{44}{28}$ This train will give an actual pitch of 0.15714 in., an error of 0.00006 in., which is only $\frac{1}{160}$ of the error we get by cutting 6 t.p.i.

The general rule, then, is as follows:— For x d.p., choose change wheels for $\frac{x}{2}$ t.p.i. and add in a driver and a driven gear in the ratio of $\frac{11}{7}$.

The error will in all cases be the difference between $\frac{22}{7}$ and π, or approx. 0.0004 in. per 1 in.

—W. S. LAYCOCK.

AN ADJUSTABLE BORING BAR

by A. D. Stubbs

ONCE upon a time, our water pump ceased to function, and amongst other re-conditioning items, the 2-in. cylinder required to be re-bored. I had no boring bar for the job, so settled down by the fireside and designed this little fellow.

Fig. 1 shows you the finished article, together with details of the bar itself. My Myford lathe will take 22 in. between centres, and I used $\frac{7}{8}$ in. diameter steel bar. For other lathes, the bar in one piece, you can ignore my flanges, but then the tailstock will have to come off the lathe bed every time you set up the boring bar, and the bar will be shorter than could be accepted in the lathe.

To obtain a micrometer adjustment, I turned the cutter-holder seating on the bar, lettered *H* in Fig. 1, eccentric. As you see, it is 1/64 in. off centre, and Fig. 2 illustrates the method I used to turn the eccentric.

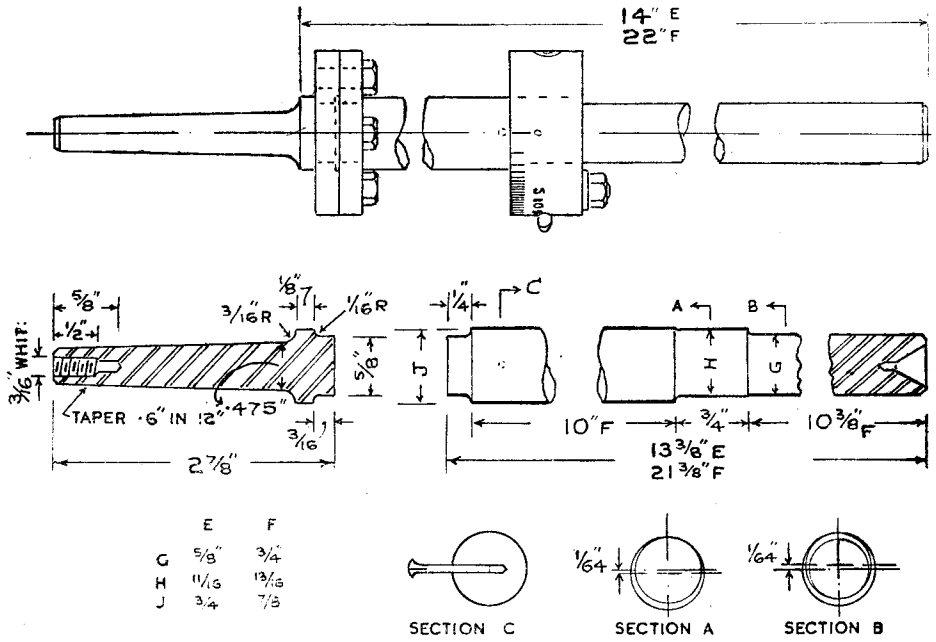


FIG. 1.

overall length will naturally have to be adjusted, and I give alternative *E* and *F* dimensions, the *E* figures being suitable for Myford $3\frac{1}{8}$ in.

If you decide to make up the tool, I strongly recommend that you utilise every fraction of an inch in length. Since the tool-bit must pass right through the work, rather less than half the saddle travel is available, and if you have to tackle a 9 or 10 in. piece of work you will want all the room you have.

For that reason I made the Morse taper shank separately (No. 1 M.T. shown). The tool parts at the set-screwed flanges, which are spigoted and recessed a push fit. At a later date I had a blind boring job to do, and for that made up a stub shaft, with flange and eccentric. This temporarily replaced the long bar shown, and is the reason why the Morse taper shank is screwed for a drawbar. If you prefer to have the whole

The finished cutter-holder is detailed in Fig. 3. To avoid the necessity of turning up a special template, I completed the holder with a temporary *G* diameter centre hole 1/64 in. off centre, as shown by the broken line. After the eccentric on the shaft had been turned, this centre hole was re-bored on the true centre to accept *H*.

Before this, the bar had been completed, excepting that the *H* seating had been left at *J* diameter. Incidentally, the flanges (Fig. 5) are a drive fit, brazed on. They were faced, and the spigot and recess machined after brazing, so the hole job is dead in line.

The cutter-holder was then mounted on the *G* diameter of the bar, and the set-up shown in Fig. 2 was adopted. A " finger " of $\frac{1}{8}$-in. steel-plate, cut as illustrated, was bolted through the two rear tee-slots on the right-hand side of my cross-slide. In turning *H*, you require a full

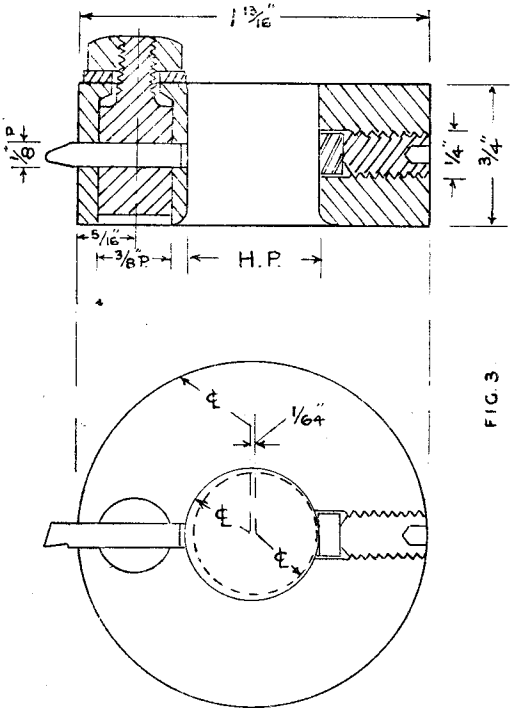


FIG. 3

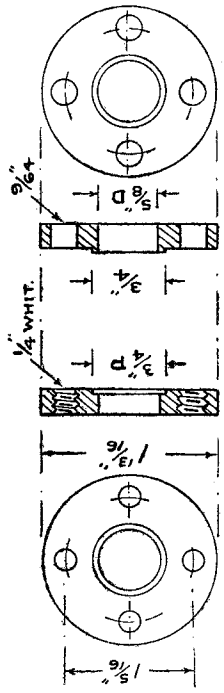


FIG. 5.

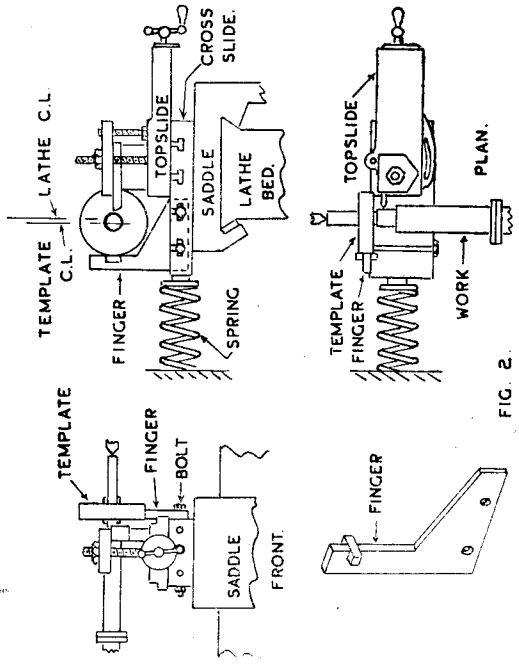


FIG. 2.

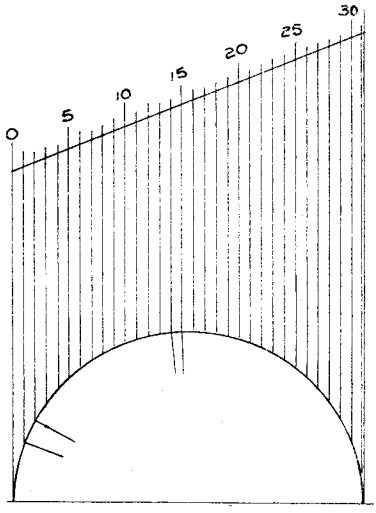


FIG. 4

$\frac{3}{4}$ in. travel, using the leadscrew, and as the finger must contact the holder throughout its travel, I recessed the finger and brazed on a strip of $\frac{1}{4}$-in. square steel on the lathe centre-line. Against this strip the holder contacts, and the faces require well oiling in operation.

As the surface of the *H* part of the boring bar will be a replica of the surface on the cross-arm of the finger, the latter should be milled at precisely 90 deg. from the drilled side of the finger which mates on the cross-slide. Otherwise the finger need not be machined.

The micrometer screw of the cross-slide was temporarily removed, complete with its attachment bracket, and a car valve-spring was set-up to push the cross-slide forward. The hatched line in Fig. 2, against which the far end of the spring abuts, is the wall of my garage, and I'm afraid that I cannot lend you that, so in the absence of something similar you will have to create a temporary rigid support for the outer end of this spring.

To carry a cutting tool, the topslide was then set on the front tee-slot, at 90 deg. from its normal position. To ensure that the tool could travel on a $\frac{3}{4}$ in. feed, this set-up needed a little careful measurement, but it all came right in the end.

The temporarily eccentric cutter-holder gives an oscillating movement to the cross-slide, and the micrometer feed on the topslide brings the tool to the work. It goes without saying that the finish of this *H* diameter must be beyond criticism. The actual diameter is not vital, as the cutter-holder can later be bored to a push fit (*P*, Fig. 3). The *HP* here is not really intended to be either horse power or hire purchase, but upon how perfect this is depends the rigidity of the whole tool.

The valve spring must be sufficiently powerful to return the cross-slide unhesitatingly as the eccentric holder rotates. This may mean slightly slacking off the cross-slide adjusting screws, but having well oiled the slides, I had no trouble in this respect, although I did not dare run the lathe as fast as the *H* diameter really required.

For the cutting tool itself I utilised an $\frac{1}{8}$-in. bit, $\frac{5}{8}$ in. long. These are standard. A rigid hold was obtained by adopting the bicycle brake system of coupling. This entails turning up a $\frac{3}{8}$ in. diameter pin, with a $\frac{3}{16}$ in. screwed end, washered and nutted. Here again, $\frac{3}{8}$ in. *P*, in Fig. 3 indicates that this pin must be a push fit in the holder. I drilled $\frac{1}{8}$ in. for the tool-bit, and my hole is very slightly oversize, so I suggest that it would be a good idea to check your own tool-bits for size before actually drilling this hole. The drill was started on the holder and taken right through holder and pin in the one operation.

On the opposite side of the holder, a hardened $\frac{1}{4}$ in. recessed-head grub-screw forces against the boring bar a specially turned up steel button, $\frac{1}{4}$ in. diameter, $\frac{3}{16}$ in. thick. To get this in position I had to bore out the inner end of the $\frac{1}{4}$-in. Whitworth hole shown. Its object is to avoid the marking of the bar, which would arise were the set-screw permitted to go right through. An adjustment when boring of 0.001 in. would then be impracticable, as the set-screw would continue to find its original seating.

And that is really all there is of it. Once the parts are assembled, there are no loose pieces. If the tool-bit is removed, the holding pin cannot fall out, as its hole in the holder is not taken right through, the diameter at the thread end of the pin being $\frac{1}{4}$ in. only. The whole job is rigid, with no chatter, and adjustment is simple.

To mark out the holder periphery by thousandths, I used the Fig. 4 set up, and for beginners this method of dividing an awkward length into any given number of divisions may be useful. The finished diameter of the holder I show as $1\frac{13}{16}$ in. but this need not be dead accurate. Having finished it, transfer it to a surface plate, or even to a piece of paper, and run out two truly parallel lines, one from each side of the diameter, as shown.

As the boring bar eccentric is 1/64 in. off centre, the holder, when rotated 180 deg., will give the tool-bit a 1/32 in. outward feed, or 0.03125 in., so we have to divide the distance between our two parallels into 31.25 parts.

To do this, you need any machine-divided scale which gives $31\frac{1}{4}$ divisions over a length greater than $1\frac{13}{16}$ in. My standards are Metric, English, an Armstrong scale and, as a last resource, a map protractor possessing eight " yards to the mile " scales, and one or the other always gets me home. For this job the English rule came right, using the $\frac{1}{16}$, which gave the line I have figured 0-30 in fives.

Transfer these divisions to the paper, then parallel them down to the holder periphery. You will see from the four radial lines which I have sketched in that the divisions are more widely spaced towards the start and the finish of the half turn. This is really an advantage, as you can set the boring bar to finish its cut round about the 30 mark, then you have a good clear reading for the final adjustment.

In operation, set the tool-bit well into the holder and lock it tight. You can now bore from the 0 marking, as shown in Fig. 1, to 31.25 which, of course, increases the bore of your work by 0.625 in. diameter, merely by slacking off the recessed head set-screw and rotating the holder on the bar in easy stages. If you require to bore out still further, return the holder to zero, bring forward the tool-bit to the work, and start again.

I should have referred earlier to section *C* in Fig. 1. To give me a dial pointer I hammered out the end of a piece of cycle spoke, and marked a zero line on this, as shown. A $\frac{1}{16}$ in. hole not quite through the boring bar accommodates the spoke.

My pump cylinder? Well, the house cannot run without water, so I sleeved it with brass tubing, and had it running again the same day, but sometime or other there is that bore to get on with.

Of course, the holder has only a limited movement, and even plus the tool-bit travel cannot cover a very wide range. As I need them, I shall make up more holders, utilising the same bit-pin, grub-screw and button, then if necessary I could bore out for miles. Or could I? There's that cross-slide in the way again!

*TWIN SISTERS

by J. I. Austen-Walton

Two 5-in. gauge locomotives exactly alike externally, but very different internally

THE material requirements of the steam and exhaust main pipe system, are simple enough. I have specified $\frac{7}{16}$ in. by .16-gauge copper tube for the whole lot, which gives a clear $\frac{5}{16}$-in. bore for the system, and which is, I think, something near the ideal for the exhaust side and plenty of margin for the live steam side.

A number of readers have written to me, stating that they simply cannot get the $\frac{7}{16}$ in. diameter tube, and would $\frac{3}{8}$ in. diameter be good enough for the job? My reply has been a general O.K. in the present difficult circumstances —what else can one do? But the *gauge* is of importance because of the thread to be cut on the ends of the pipes, and, as it is, there will not be too much in marginal strength with a 40 t.p.i. cut to its full theoretical depth. However, most of the threaded parts will later be silver-soldered, and so the strength will be restored.

And what else? Pipe flanges, which should be made from a really good quality bronze or gunmetal, and this is because with a lozenge-shaped flange, with only two fixing bolts, tightening tends to pull the two ends together, leaving a bowed centre part where intimate contact is most required. Naturally, a soft ductile material tends to do this, but a hard, rather "short" grained bronze will resist the strain with plenty of strength in reserve.

Some packing material of the "Hallite" variety will also be needed. I have used 1/32-in. sheeting with great success, but you could go up to $\frac{5}{16}$ in. in thickness if you feel that the flanges are not going to behave as they should. Set-bolts, although not mentioned on the drawings, are shown clearly: 4-B.A. with 6-B.A. heads for preference, and not threaded more than is necessary to tighten up without binding up on the plain portion. Material?—Stainless-steel—how did you guess? But for those who have steadfastly turned their faces against its use, a good hand-drawn bronze or even high-tensile steel would do. In any case, these are specially-made bolts, and you would be very ill-advised to use the standard mild-steel or ex-wireless set, type of brass screw.

The most significant part of the bolting up of the flanges, is the system. Note that each flange has one tapped hole and one clearing hole; this enables four bolts to be put in from the top and four from the bottom, and all eight are readily accessible. To depart from this order might lead to no end of trouble later on, as a brief examination of the set-up will soon reveal.

The other special item shown on the drawing, is the pipe bending jig. This is well worth while making up in order to get neat and tidy bends; you may also have recourse to its use later on when some pipe work comes to light in connection with the boiler. Any old piece of steel plate, about $\frac{3}{8}$ in. thick, which need not be machined at all, will do for the base portion, whilst a couple of bobbins, turned up from steel, aluminium, brass or any metal of the desired diameter that happens to be in the scrap-box, can be utilised. I have specified two bobbins because I consider that it is easier than making just one bobbin and a matching flat shoe to do the drawing round of the tube; not only that, a tube with a double sharp bend can be produced without extra trouble or time.

And now for the pipe system itself. All the pipe bends are of the same length and angle, which makes things simpler still. Take four pieces of pipe of surplus length, or better still, two long pieces which can be threaded at each end whilst the pipe is still in the hard condition.

Now anneal the two ends, but not too far up —say two inches only; this will leave the rest of the pipe stiff for use as a bending handle, and also leave the residue of the pipe in the correct state for threading the four straight portions to follow..

Now set the bending jig in the vice, put the pipe between the two rollers or bobbins, and draw the pipe gently round one of them until the required angle is reached. It would be a good plan to cut out a piece of cardboard as a pattern, or even a bent wire to act as a guide; the best of all, the full-size blue print now available would enable you to lay the bent pipe on the drawing direct, to get a true comparison. It would be difficult for you to go wrong at this stage unless you put the pipe too far through the jig at the start. I suggest therefore, that you *start* the bend and then withdraw it for examination.

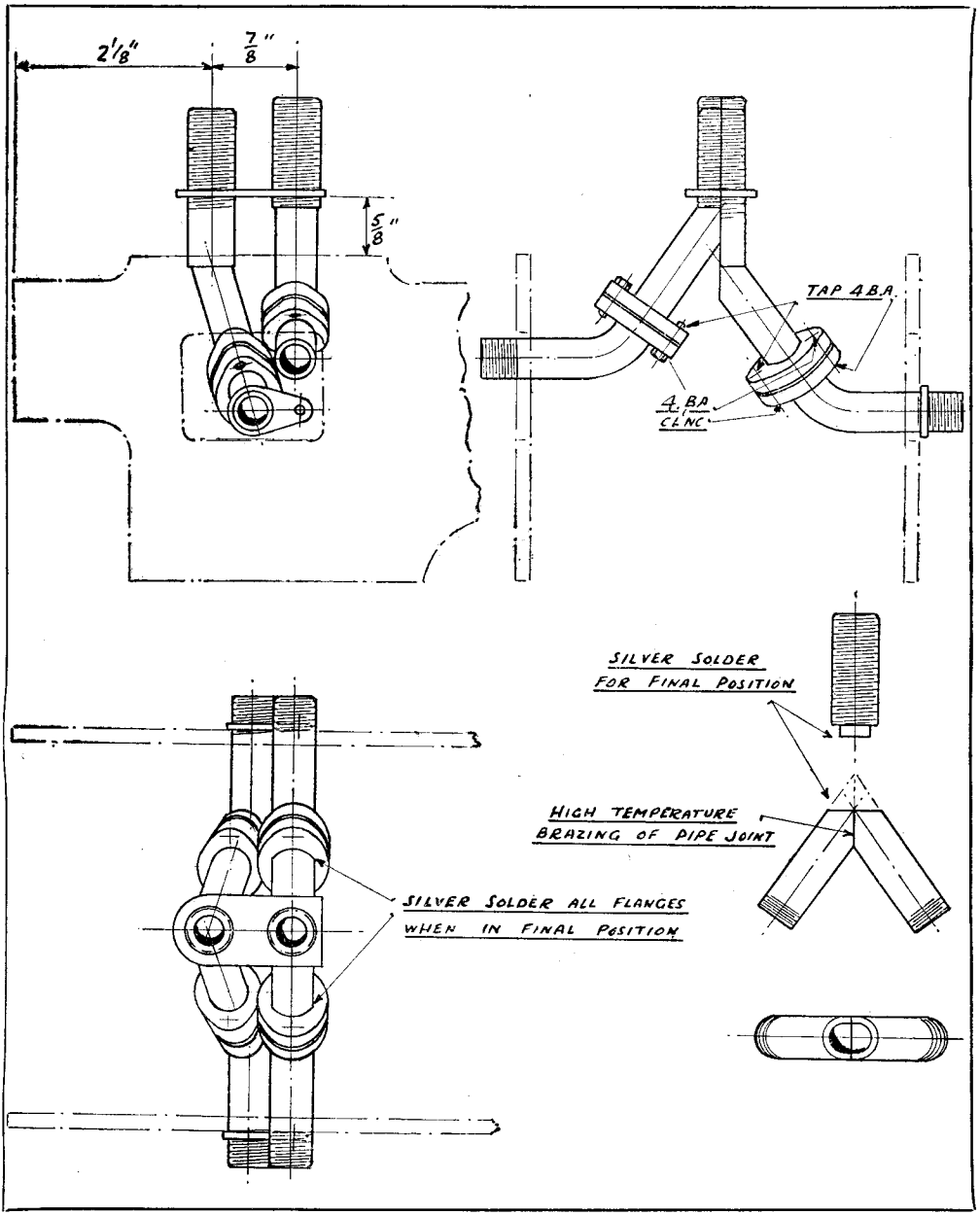
For further protection, especially at the threaded end, you could make up a simple metal plug to fit in the free end of the pipe, to be withdrawn after the bend is completed; one plug would do for all bends, of course, and it is worth the trouble of making.

I expect you all know what annealing is, but in case you want your memory refreshed, it merely entails heating the pipe to a bright red, holding it at this temperature for about a quarter of a minute, and then plunging it into cold water to quench. As a matter of interest, it is the time for which it is kept at the high temperature that determines the degree of softness in the metal; but for our purposes, the figures given will suffice, and you should no need more than one annealing for such a straightforward and obtuse set in the pipe.

*Continued from page 325, "M.E." September 6, 1951.

Enter "Caution"

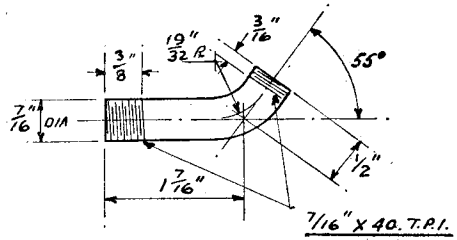
But now we have to put a thread on the other end of the bend, after it has been cut off; the chances are that the annealing has gone just a shade further than we intended, and meanwhile we have to hold the bend which is still in a fairly soft condition. The safest way to do this is to leave the "anti-thread-squashing" plug in place, and to turn up another plug to slip in the end to be threaded. This should have the merest suggestion of a shoulder left on the part sticking out, so that it will not engage on the die to be used, and yet leave something by which it may be pulled out after threading. Coupled with this, I would add that the most judiciously gentle holding in the vice, the use of a really sharp die, and the correct lubricant should enable you to breathe a sigh of relief at seeing an undamaged, undistorted pipe bend, lying in the palm of your hand—and the knowledge that you



are well on the way to getting the job done without much trouble.

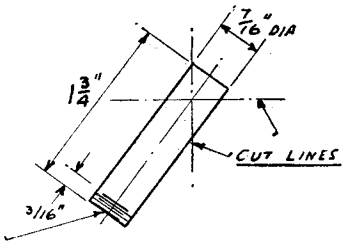
Now, two of the bends will fit in the cylinder block itself. If these are in the rust-resisting cast-iron, they will need some form of fixing to prevent their turning round or getting loose

" sweating," I mean just that, and not a rather insincere dabbing round with a warmish soldering iron. Sweating entails heating up the entire block to the melting point of the solder, and you may not like the idea of doing so ; some folk are a bit squeamish about distortion and that sort



STEAM AND EXHAUST BENDS.

4 OFF — COPPER TUBE 7/16" DIA X 168.



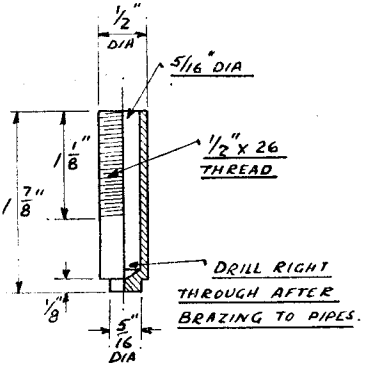
STEAM AND EXHAUST PIPES.

4 OFF — COPPER TUBE 7/16" DIA X 168.

while you are fiddling about with the remaining parts. True, these bends are on the exhaust side, and will not have to withstand any pressure, but leakages of any sort are always undesirable and tend to make an engine " messy." For the purposes of fixing, I have introduced fixing tabs which are threaded to fit the pipes (a tightish fit if possible, so that they will not flop about when arriving at their ultimate position). The other, or free end of the tab has a hole for a set-bolt to screw into the cylinder block, so that, when the tab is finally silver-soldered to the pipe,

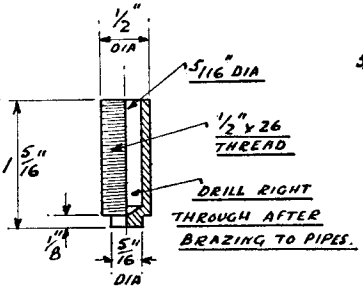
of thing—even at the melting heat of soft solder.

But the fixing of the live steam bends into the steam-chest, is another matter. Here I definitely do not recommend the use of soft solder. With quite a reasonable degree of superheat, it is possible for soft solder to become a bit plastic, even if it doesn't melt or run. It is so easy to silver-solder these bends in place, as I did, that other methods do not appeal to me. The live steam bends to the steam-chest, are dead vertical, so you can fix these straightaway ; should any very slight variation or correction become



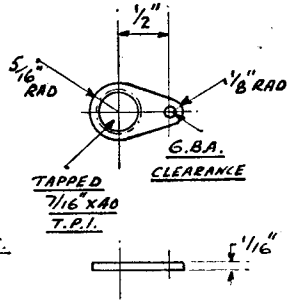
MAIN EXHAUST PIPE

1 OFF — IN GUNMETAL OR BRONZE.



MAIN STEAM PIPE

1 OFF — IN GUNMETAL OR BRONZE.



EXHAUST BEND SECURING TABS

2 OFF — IN BRASS.

it will give a permanent and completely firm locking to the pipe, and maintain its true position for all time. In the case of gunmetal cylinders, you could either carry out the above procedure, or resort to sweating the pipe in after it has been crewed to its final position ; when I say

necessary later, you will find the pipes soft enough to yield a degree or two, and that is all you will need.

If you would care to free yourself from " The miseries of pipe bending " for a while, and as a locomotive-building friend of mine once put it,

you can turn your attention to the making of the pipe flanges, which you will need forthwith. The flanges call for no particular comment, except to remind you of the one tapped and one clearing hole in each. You can go ahead and screw a flange to each pipe, leaving the fixing holes in their right relative positions for a start, and remembering that any future "height adjustment" via the flanges must be brought about with one *complete* turn and not a *half* turn.

Before returning to work on the copper pipes, you might as well make up the remaining fittings; these comprise the unions, lock-nuts, pipe washers (radiused on one face to match the inner contour or radius of the smokebox) and the pipe bridge-piece. The latter is a very important item, and for a reason that may not have occurred to you.

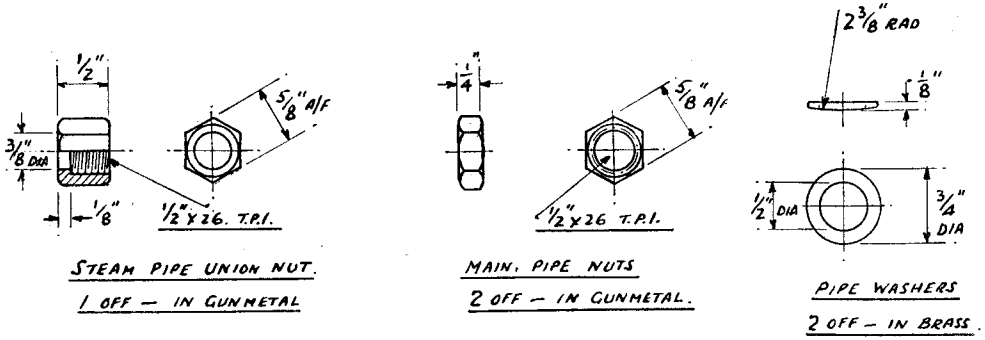
Smokebox Disease

I think this description is apt. Those people who have really worked their engines hard, will tell you that with the effects of inferior coal, mains water, protracted periods of heat, corroded oil, sulphuric acid in the air, and Uncle Tom Cobley and all, that union-nuts in the smokebox have a way of simulating a synthetic form of welding of themselves in place that is only matched by the more intentional form of welding; to that you may add that, as a rule, in the rather restricted smokebox space, the removal of any form of nut calls for a spanner that can permit of no form of handle, whilst the spanner portion itself should have no width or thickness to speak of. In such circumstances, the recalcitrant nut is only removed after it has successfully disembowelled everything to which it was once attached—I have personal and bitter recollections of such circumstances, over which I would now draw a decent veil. The pipe bridge piece alters all that; once in position it acts as a permanent spanner to its near neighbour, and in a completely reciprocal manner. All the same, it is a good plan to smear the inside threads of all union nuts with graphite grease as a precaution.

Re-enter the Pipes

There are no pipe bending terrors this time, but only some careful cutting at prescribed distances and angles. First of all, thread the ends of pipe as before, but do not anneal at all. Now screw on the flanges, and bolt on one of the pipes to one of the bends, leaving all the spare pipe sticking up in the air. On looking at the drawing you will notice that the vertical cut in the pipe comes dead on centre-line between the frames. It should not be beyond your ingenuity to fix up a temporary sheet-metal jig or frame to drop down between the engine frames; this would in effect, provide a central and vertical plate with one surface of the plate dead on the centre-line between frames.

From this plate you can scribe round the pipe for its oblique cut, after which you can remove the pipe and do the necessary. Follow on with the next pipe from the other side, and so on until all four straight pipes have been marked and cut. Replace all four pipes in position, with all fixing-studs tightened up. Now take another look at the drawing, noting the spacing from the front of the locomotive frames, and the spacing between each unit. If you are skilled and cunning, everything will come out exactly right, but as everything has come out in a different position from that shown on the drawing, you can start bending the pipe assemblies until they *do* come right. Skilled copper smiths do this, but they call it "final pipe setting."



The next step is fairly obvious, and that is to cut the pipe assemblies in the vertical plane, again to give the right position above the frame top edge. If you want to, you may vary the procedure by removing the pipes from the bends, and *hard* brazing the embryo forks together. By hard bracing I mean something with a higher temperature than silver-soldering. Sif-bronzing, done with the oxy-acetylene flame is the ideal solution, but the old-fashioned brazing strip and borax would do equally as well.

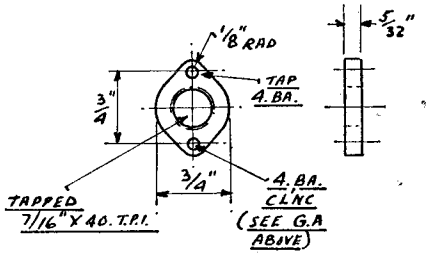
If you have adopted this alternative, you will most probably have some more "pipe setting" to do, together with some turns, one way or the other, to the pipe flanges which should not yet be fixed. By all these devious ways of fiddling about, you will ultimately arrive at the state where the final cutting can be made, and you will be ready to fit the bridge piece and the main threaded and turned pipe pieces. These are first threaded through the bridge piece, and then set up on the assembled pipe units. By screwing these up or down, you will be able to adjust the bridge piece both level and at the prescribed height, and don't forget that these

dimensions are *important*; failure to observe them will result in your getting into trouble with the fitting of the smokebox, to say nothing about the blast pipe nozzle being out of line with the chimney.

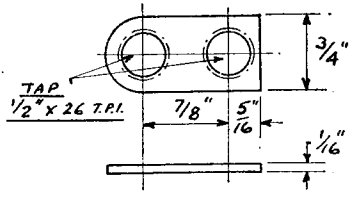
And now, let us take stock, just to see whether we have forgotten something; the position should be as follows:

Steam bends silver-soldered into steam chests, and the bends set vertical. Exhaust bends, with locating tabs screwed on (but not yet silver-soldered to the pipes) set into cylinder blocks; locating tab set-bolts in place. Both "Y" pipe units bolted to bends after hard brazing, and with gaskets on joints *before* cutting off tops of "Y" bends to correct level above frames.

I think that is all, so far; very well, to continue: The sawn off tops of the inverted "Y" (or if you like, "V") bends should be cleaned and dressed so as to admit the turned down portion at the bottom of each screwed main pipe connection. If you can make these fits a shade on the tight side, it will help you in the next silver-soldering operation. Once you have got the bridge piece level and adjusted for height, you can remove both pipe sets and set up the bridge and main pipe assembly on the top. Chock it up so that you can heat up the whole lot, running a fillet of silver-solder round both threads where they come through the bridge piece, and also round the spigot to pipe joint on each.



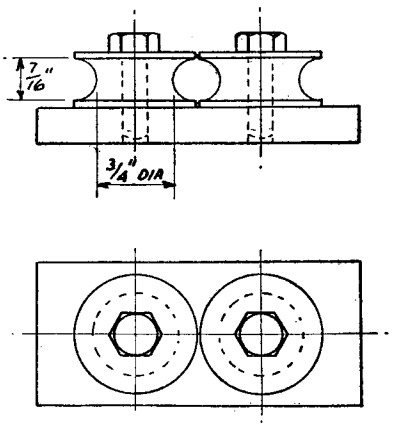
PIPE FLANGES
8 OFF — IN GUNMETAL OR BRONZE.



PIPE BRIDGE PIECE
1 OFF — IN BRASS.

After this, you can clean up and complete the through drilling of $\frac{5}{16}$ in. right through the blind lower end of each main pipe connection. Be careful not to let the drill run wild, and get caught up in the pipes inside; and after drilling, clean out all traces of metal chips that may have become lodged inside.

Now set up the completed unit on the four bends in place complete with gaskets; you may have to do a little more bending and setting, to get things quite right, but this should be quite easy. When you are satisfied that things are quite in order, remove the top unit, being careful not to disturb the flanges. Remove the other four bends, taking equal care regarding the setting



SIMPLE PIPE BENDING JIG.

of the flanges *and* the locating tabs. Finally, we come to the silver-soldering of all the flanges and tabs in one whole batch; then cleaning up all round, putting together and testing under pressure.

I know all this sounds a bit long-winded and not a little complicated, but when you come to do the job you will find it does not take very long to complete. I did my own set in one afternoon, and I was not rushing the job.

(To be continued)

Steel Boilers

Mr. H. E. White writes—"With reference to Mr. Austen-Walton's remarks about steel boilers, it may interest your readers to note that 20 years ago Mr. W. T. Averill, in the issue of September, 24th, 1931, described a 5-in. gauge tank loco with steel boiler of which full details were given.

A month or two ago I visited Mr. W. H. Hart's workshop in Kensington, and noticed an old engine on the bench which had come in for repairs and alterations. After one glance at *Sir Benjamin* I recognised the engine, with its steel boiler, and as far as I know the boiler is still in good working order. Judging by the appearance and condition of the engine I should say the boiler has seen plenty of service, and must still be good for further service after all these years, otherwise the owner would not be willing to spend money on alterations. Perhaps Mr. W. H. Hart would let us know more about this boiler."

Novices' Corner

Machining a Saddle Fitting

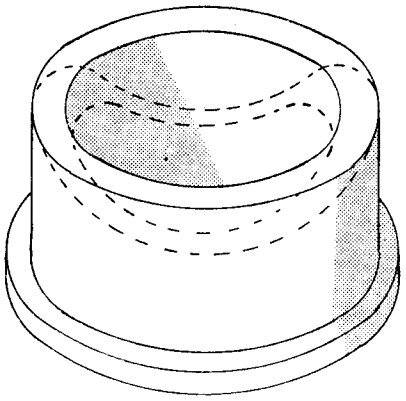


Fig. 1. The saddle fitting

WHEN a component, like that illustrated in Fig. 1, has to be hollowed out to fit exactly on to a cylindrical part, such as the boiler of a small locomotive or a large pipe, the work can, of course, be done by filing and scraping until the surfaces of the two parts make full and even contact. However, where a large saddle fitting has to be bedded, the work of fitting by the use of hand tools, alone, may be found somewhat laborious; but if the bulk of the surplus metal is first removed with the hacksaw and file, the final exact mating of the parts can readily be obtained by a straightforward machining operation in the lathe.

Moreover, those who prefer to rely on handwork may find that, towards the end of the fitting process, progress is apt to be slow, and much time may be occupied before an accurate fit is obtained. On the other hand, machining the saddle fitting requires only that the part be secured at centre height to the lathe saddle so that the work can be traversed past a cutting-tool set to the correct radius.

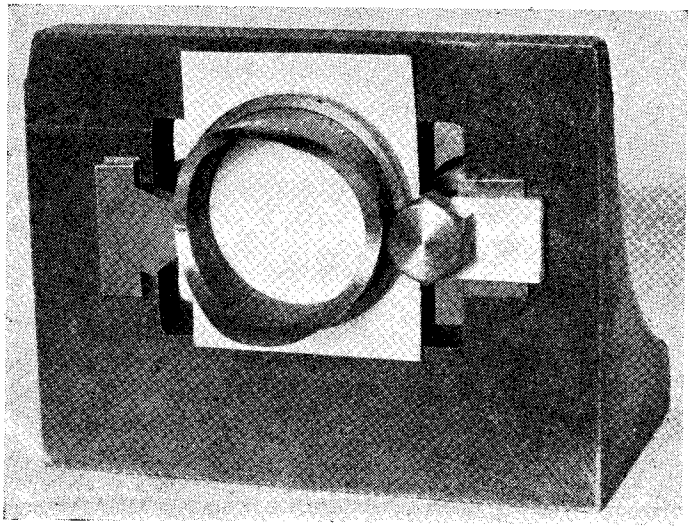


Fig. 2. The fitting clamped to an angle-plate

The Machining Operation

After the depth and the approximate shape of the hollow have been marked-out and then filed roughly to shape, the fitting is clamped to an angle-plate, as shown in Fig. 2. A more secure grip will be obtained if the part is backed by a piece of blotting paper or thin card, and distance-pieces or packings are placed under one side of the bolt heads, as illustrated in Fig. 3. The angle-plate is next bolted to the lathe boring-table and set parallel with the lathe axis, with the aid of a try-square held against the side of the boring-table. To set the centre-line of the component at lathe centre height, the diameter of the part is first measured, and the upper surface is then set at half this distance above the point of the tailstock centre. Needless to say, the roughed-out hollow should, at the same time, be set to lie horizontally, but there will be sufficient surplus metal present to cover any small errors in the setting.

Now that the work has been correctly located and firmly clamped in place, it remains to arrange for a suitable radial cutter to do the actual machining. A boring bar, of the kind described in a previous article, is mounted between the lathe centres, or one end of the bar can be gripped in the chuck and set to run truly. It may be remembered that it was suggested that the portion of the bar adjacent to the cutter mounting should be machined to run truly as an aid to setting the turning radius of the tool. Now let us suppose that the diameter of the bar at this point is exactly $\frac{3}{4}$ in. and that the workpiece or saddle fitting

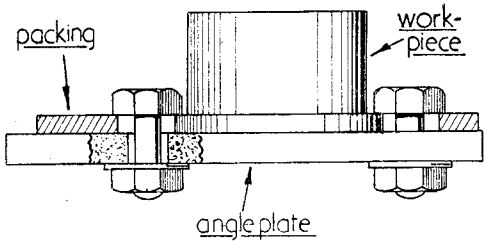


Fig. 3. Showing the method of fitting the clamp-bolts

has to mate with a cylindrical part exactly 2 in. in diameter. This means that the radius of the cutter, measured from the centre of the bar to the cutting edge of the tool, must be precisely 1 in., or in other words, the cutter has to project for $\frac{5}{8}$ in. from the surface of the bar. As so much trouble has already been taken, it will be worth while to set the cutter correctly, so that the saddle, when machined, will fit accurately in place. Those who are not prepared to do this will probably set the cutter with a rule and then take a series of trial cuts over the work ; the bar is then removed from the lathe and the parts are tried together, so that, if necessary, further adjustments of the tool can be made. To do the job properly, and to avoid the trial and error method of working, the cutter is set, once and for all, by using the dial test indicator in conjunction with the index of the cross-slide feed screw.

Attach the test indicator to the pillar of the surface gauge, and push down the base register pins so that they engage against one of the cross-slide T-slots. Feed in the cross-slide until the test indicator, when in contact with the bar, reads zero, and set the cross-slide index also to zero. Next, turn the lathe mandrel until the cutting edge of the tool lies at centre height ; turn back the cross-slide rather more than the required $\frac{5}{8}$ in., say $6\frac{1}{2}$ turns for a 1/10 in. pitch feed-screw ; bring the contact point of the test indicator opposite to the cutter, and feed the cross-slide inwards until its index reads 25, that is to say, six turns plus 25 thousandths of an inch, which is equal to 0.625 or $\frac{5}{8}$ in. With the cross-slide in this position, it is now only necessary to set the cutter outwards until the test indicator again shows the same zero reading as previously.

Although this may seem a lengthy and involved routine, in practice the tool-setting can be carried out quite quickly, and with but little chance of error. The acutal machining operation consists in traversing the work over the rotating cutter,

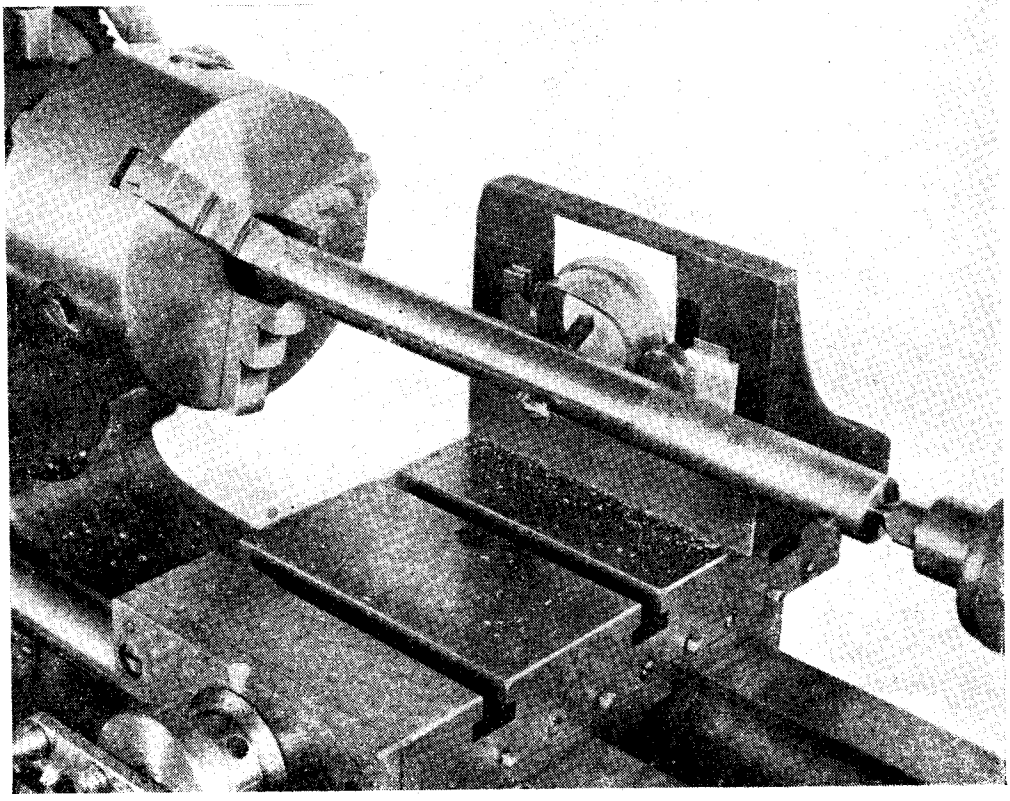


Fig. 4. The work set up for machining

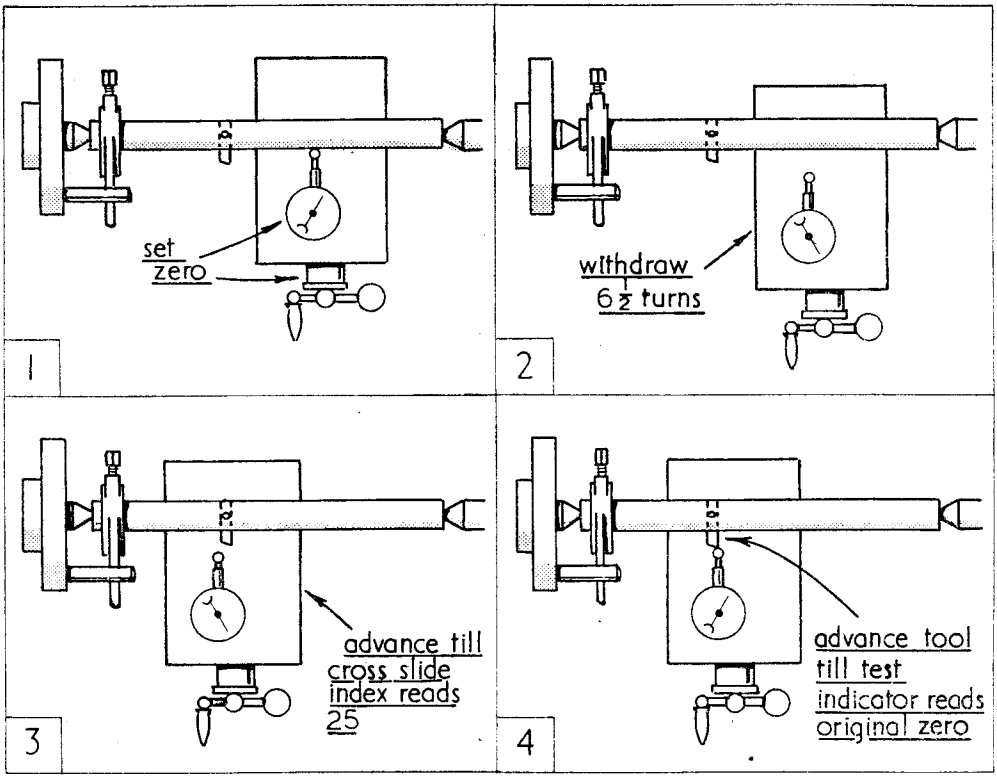


Fig. 5. Setting the cutter in the boring bar to the correct radius

but only light cuts should be taken, as the intermittent cutting action is apt to displace the workpiece unless it is very securely held. By feeding the cross-slide outwards, the hollow in the saddle fitting is machined to the required depth, indicated by the marking-out lines, but the radius of the concavity will, of course, remain constant throughout. Should any error of measurement or setting have been made, the radius of the hollow can be easily corrected by making a fine adjustment to the tool, so that an accurate fit is obtained. For this purpose, the test indicator is again brought into its former position on the lathe saddle, and the projection of the cutter is adjusted, either inwards or outwards, against the indicator, to reduce or increase the radius of the concavity machined in the saddle fitting.

When applying the test indicator in this way, the lathe mandrel should be turned by hand in the reverse direction, and the highest reading obtained will then indicate the cutting radius of the tool.

By using the adjusting-screw fitted to the bar, the radius of the tool can readily be reset to within half-a-thousandth of an inch.

Self-feeding Suds-Brush

The Rev. Miles Sargent writes :—" Mr. Lawrence Sparey gives us a useful gadget here, but he warns us that the brushes soon wear out.

" Having ma dea similar affair not long ago, I found the same trouble, but got over it by substituting lamp wick for the brush. A length of ½-in. wick, such as is used in hurricane lamps, 3 in. long, was folded double and slipped into a flattened tube with the folded end outside where the bristles of the brush would be. I had to have a tap to regulate the flow, but I soon found the right setting and never turned it off as I slung the tube, as does Mr. Sparey, above the tank. The wick is doubled for this reason, as when I tried a single wick it very easily frayed and got caught in the swarf as it came off the job. The folded wick has stopped this and gives a smooth stroking effect. I also found that by using a thick-walled india-rubber tube, it would hang in a curve clear of the work, but also be instantly ready when wanted."

PRACTICAL LETTERS

Musical Boxes

DEAR SIR,—I was very interested in your paragraph on the above subject in a recent issue of THE MODEL ENGINEER.

Some time ago I had a similar experience to that of your " very dear friend." I bought an old musical box as a present for my wife, who has a great love for them, and was bitterly disappointed to find after cleaning away the accumulated dirt of many years, that all the pins on the drum were either bent or broken. I have restored the instrument so far as the working mechanism is concerned, but am rather stumped to know how to replace the pins in the cylinder. I have thought to use dressmakers' steel pins but so far have not been able to obtain any fine enough.

I shall be most grateful for any information on the subject which you can offer.

Yours faithfully,

London, N.15. J. R. WALKER.

DEAR SIR,—I was very pleased to read in THE MODEL ENGINEER of September 13th your idea of a get-together on music boxes. The kind I have in mind are the small ones of about three octaves which will play a simple tune. So far my experiments have not been very successful, due to unsuitable steel and the difficulty of cutting the comb part. Would a fine slit saw be suitable for slitting, if so, where can I obtain these saws of about .008 in. to .01 in. thick ? Also, would silver-steel plate be better than spring steel ? I have tried slitting with a fine piercing saw, the only kind I can obtain locally, would prefer some the same thickness but deeper. None of the tool shops can give any information on the subject of saws. The thinnest circular saw is 1/32 in. thick and of varying diameters. I understand how they work, but boiled down, I would like to know something about the type of steel used and how it is cut. I would be very grateful for any help.

Yours faithfully,

Blaenavon, Mon. R. J. LEWIS.

Gas Turbines

DEAR SIR,—The gas turbine, like many other prime movers, has been gradually developed from crude machines. Many unknown inventors have probably toyed with the idea of driving a turbine wheel by the force of gases produced by the combustion of liquid, and even gaseous fuels. Apparently, the first recorded project for a gas turbine in Britain was by John Barber in 1791.

In later schemes, many improvements were effected and arrangements introduced for maintaining constant pressures by continuous combustion of the fuels used.

The axial-flow air compressor, as well as the centrifugal blower, essential for supplying large masses of air were subsequently devised, and today are largely responsible for the successful development of the gas turbine.

The following short list of personages associated with gas turbine research and development may be of interest to Mr. Martin Wm. Bowden Storey.

Leonardo da Vinci credited with the first air or gas turbine coupled to a " smokejack."

1648. Bishop Wilkins describes in his book *Mathematical Magick* a bladed wheel worked by currents of hot air.

1791. John Barber, Derbyshire, was granted the first patent for a primitive turbine ; probably the idea was to dispense with the beam and reciprocating movements common to engines of the 18th century. Air and gas mixture was the source of power.

1850. Redtenbacher suggested the use of heat energy by a gas turbine in preference to that common in steam engine practice.

1853. M. Tournaire read a paper before the Academie des Sciences on a turbine idea by M. Burdin.

1905. Armengaud and Lemale constructed a small turbine.

1905. Holtzworth introduced the constant-volume turbine running on oil, pulverised coal, etc.

1906-1908. Korting produced turbines incorporating Holtzworth's ideas ; one developed 1,000 h.p.

1884. Hon. C. A. Parsons, of steam turbine fame, in his " master " patent covers the idea of driving his reaction steam turbine by the combustion of gases.

1909-1913. Brown & Boveri, Switzerland, built a machine to Holtzworth's design.

1914. Thyssen conducted experiments with various designs of turbines.

1928. Brown & Boveri brought out improved Holtzworth machines operating on a new cycle and using blast furnace gas as a fuel. The exhaust gases passed through a " Velox " steam generator.

1937. Frank Whittle reduced his turbine ideas to practice by designing a practical turbine. The first British jet 'plane flown in 1941. The achievements of Sir Frank Whittle are too well known to need consideration here.

1943. Aero engine exhaust gas driven turbines employed to drive centrifugal superchargers to enable aircraft to operate at greater altitudes.

Early turbines were of the single-stage variety, but today the multi-stage type is becoming general for large power. For many applications a reduction gear becomes necessary.

Before this form of prime-mover becomes a serious rival to the parent machine, the steam turbine, much research and development will have to take place.

The writer still possesses drawings for a single-stage gas turbine which he designed in 1911 ; this was before the days of the centrifugal blower ; therefore, it was proposed to use a piston-type compressor to force a mixture of town gas and air into combustion chambers arranged around the turbine casing at right-angles to the turbine wheel. Spring-loaded valves were provided to open at a predetermined combustion pressure to admit the products of combustion through guide vanes on the turbine wheel.

Fortunately, wisdom overruled enthusiasm and the scheme was dropped, since experimenting is an expensive business.

Yours faithfully,

Cannock. H. R. LANGMAN.

Camera Construction

DEAR SIR,—I have enjoyed the articles on this subject and would like to see more. My choice of the type of articles I would like are neatly summed up by both Mr. Cruttenden and Mr. McClelland, more particularly the construction of a single lens reflex.

Yours faithfully,
Lennoxtown. F. J. PUZEY.

Propeller Testing Tank

DEAR SIR,—On behalf of the North London Society of Model Engineers, I wish to thank Mr. D. H. Chaddock for his criticism and suggestions on my tank.

We have decided to redesign the tank, using some of Mr. Chaddock's ideas, such as the direct drive for the motor, which, as he says, will cut out the losses in the chain drive.

This kind of constructive criticism is very welcome and useful, and shows the value of the co-operation between model engineers.

Yours truly,
London, N.18. L. V. RAXWORTHY.

CLUB ANNOUNCEMENTS

The Society of Model and Experimental Engineers

The next meeting of the society will take place at the Caxton Hall, Westminster, on Tuesday, November 6th, at 7 p.m. A number of films loaned by the British Iron and Steel Federation and steelmakers dealing with the manufacture and use of steel will be shown. Special films will deal with "Nitralloy" and the heat treatment of high-speed steels.

Ladies and visitors will be especially welcome, and forms of application to join the society may be obtained from the Hon. Secretary, A. B. STORRAR, 67, Station Road, West Wickham, Kent.

North Wales Model Engineering Society

The society held their first meeting of the season recently, when 18 members were present and letters from several others offering to join were read. Mr. P. J. Harrison (Rhyl) was re-elected to the chair, and Brig. D. J. R. Richards took over the duties of hon. secretary and treasurer from Mr. A. P. Parke who felt unable to continue in office owing to pressure of other work. It was agreed that no attempt be made at present to set up a club workshop, most members preferring to work at home, and that the meetings should be held fortnightly in Colwyn Bay as being the most central area. It is hoped to find at a later date a room which will enable us to hold our meetings in reasonable comfort and also to run models after the formal business has finished. The holding of an exhibition and visits to places of engineering interest are under consideration.

It is hoped to have a 3½-in. gauge track available for locomotive enthusiasts early next year, and anyone interested in joining the society is invited to write to the Hon. Secretary, D. J. R. RICHARDS, Cwymp Mill, Llanddulas, North Wales.

Winchester and District S.M.E.E.

The first "Open Night" was held at our new workshop and meeting-room, The Hut, Stanmore Recreation Ground, on September 26th, and included a small exhibition of members' work and a showing of the Petroleum Films Bureau's sound film "The Cornish Engine."

At present, we hold meetings every Thursday evening at 7.30 p.m.; but, for a trial period—dates to be announced later—we intend to hold meetings on Wednesday and Thursday evenings in alternate weeks. New members will be particularly welcome.

Hon. Secretary: C. H. BUSHBY, 7, Fox Lane, Stanmore, Winchester.

Bethnal Green Society of Model and Experimental Engineers

The annual general meeting of the above society will be held at the Bethnal Green Men's Institute, 229, Bethnal Green Road, on Thursday, October 25th, at 8 o'clock. Prospective new members will be welcome.

Hon. Secretary: B. R. FOREMAN, 14, Talwin Street, E.3.

Guildford Model Yacht, Power Boat and Engineering Society

This society's recent exhibition contained a large display of locomotives, stationary engines, race cars, sailing yachts, radio-controlled aircraft and a variety of other models. Many of the exhibits were loaned by the members of the Cranleigh, Dorking and Aldershot M.E. societies, and by Vickers (M.E. and sailing section), and the Weybridge Model Railway Society. A passenger-carrying track was in operation and another track for visiting friends to put their locomotives in steam. From all angles the event was entirely successful.

Hon. General Secretary: W. E. ROBERTS, Cannock, 52, Saffron Platt, Guildford.

Croydon Society of Model Engineers

Since the publication of our previous announcement there has been an alteration regarding the "Half-year Competition" on November 8th. One of our members, Mr. Miles, proprietor of "Onward Motors" has kindly offered us the use of his showrooms, so we have decided to hold an exhibition there, instead open to the general public and to which we cordially invite readers; there will be no charge for admission.

The date is November 10th (Saturday) starting at 2.30 p.m. and closing at 8.30 p.m. The passenger track will be in operation, also models running on compressed air. The showrooms are on the main Croydon 'bus and tram route, the address being "Onward Motors Croydon," 417, Brighton Road, South Croydon.

Also, on Thursday, November 22nd, Mr. N. M. Peters will give a talk on his destroyer *Barrosa*, which won the Willis Cup at the recent "M.E." Exhibition.

Hon. Secretary: E. R. VAN COOTEN, 29, Kingsdown Avenue, South Croydon.

Glasgow Society of Model Engineers

Syllabus for session 1951-1952. Speakers and dates.

1951.
October 27th. "Camera Construction." Dr. A. K. Tulloch.
November 10th. "Pattern Making for the Amateur." T. Grant. (Member.)
November 24th. "Moulding for the Amateur." Wm. Ward.
December 8th. "Hand-turning": "Tools and Their Uses." "Scotia."
December 29th. "Laying out a Locomotive Valve-Gear." John W. Smith. (Member.)

1952.
February 2nd. "Leaves from my Diary." Wm. H. Denwick. (Member.)g
March 1st. "Buildin a 5-in. Gauge Stirling Single." John Hay (Member.)

Harrow and Wembley Society of Model Engineers

The society recently held a very successful exhibition. About 170 models were displayed, some from neighbouring clubs, to whom thanks are due for their support, together with some excellent work by members' ladies in the handicraft section. The standard of the exhibits was, in fact, higher than on previous occasions, and great interest was shown in the models displayed in all sections. Added interest was given by Mr. F. Cottam's dock shunting locomotive working under steam.

Judging took place during the morning, and prizes were distributed in the evening by the chairman's wife, Mrs. Sedcole. Thanks were extended by Mr. Sedcole to all who had contributed to the success of the exhibition and in particular to Mr. S. Emery, the navigator of the show.

The number of enquiries made during the day would suggest that our membership will be increased in the near future. To the potential new members, we offer a cordial welcome.

Hon. Secretary: C. E. SALMON, 11, Brook Drive, Harrow.

Bromley Miniature Power Boat Club

We shall be pleased to receive applications for membership from builders of free-running and radio-controlled prototype power boat models of all types. The club water is at Bromley, Kent.

Hon. Secretary G. O. CAIRD, 26, Blackbrook Lane, Bickley, Kent.